

# Non-scarring diffuse hair loss in females (18-45 years) of age

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## Abstract

**Objective:** To evaluate the etiology and severity of diffuse non-scarring hair loss in Iraqi females of the reproductive age.

**Methods:** The study is a prospective observational study conducted at the Dermatology Center, Medical City Teaching Hospital, Baghdad, Iraq from March 2021 to September 2022 on a convenient sample of 100 female patients 18-45 years of age who presented with non-scarring diffuse hair loss, decrease in hair density or both for at least 1 year. Full history, general and local scalp examination, hair pulling test, 24 hour hair count, hair density count, Dermatology Life Quality Index and relevant blood investigations were done for all patients.

**Results:** The highest proportion of study patients were in the age < 25 years (46%). Regarding hair pull test, it ranged from 3-20 hairs with a mean of 5.7 hairs and 24 hours hair count shed ranged from 21-700 hairs with a mean of 157.22 hairs/24 hours, hair density in the vertex was  $80.47 \pm 19.05$  hair/cm<sup>2</sup>, left temporal area  $82.23 \pm 18.85$  hair/cm<sup>2</sup> and right temporal area  $83.19 \pm 18.8$  hair/cm<sup>2</sup>. By investigations Hemoglobin was < 12 G/dl in 45% and serum ferritin was <40µG/l in 54% of patients.

**Conclusion:** The most common diagnosis for hair loss in females of 18-45 years of age was telogen effluvium followed by androgenetic alopecia. Young females (less than 25 years) constituted the majority. Detailed history, general examination, local scalp examinations and investigations are important in diagnosing, evaluating and finding the etiology of diffuse non-scarring alopecia in young females.

**Keyword:** Non-scarring; Diffuse hair loss; Reproductive age.

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## Introduction

Alopecia defined as “absence or loss of hair” is commonly perceived as a cosmetic problem. However, it has profound effects on the life of the patient, leading to low self-esteem, anxiety and sometimes depression.<sup>1</sup>

Alopecia can be categorized into scarring and non-

scarring depending on the pathological process. Both groups can be patchy or diffuse. The diffuse non-scarring form is the most common type.<sup>2</sup> Young adult females are usually the most common sector of the population complaining from the diffuse non-scarring alopecia and consulting doctors and non-doctors with a considerable expenditure of money on diagnosis and treatment.<sup>3</sup> It was stated acute and chronic telogen effluvium (ATE and CTE) and Androgenic Alopecia (AGA) are the main causes.<sup>4</sup>

The study is a prospective observational study conducted at Dermatology Center, Medical City

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Teaching Hospital, Baghdad, Iraq from March 2021 to September 2022.

The study included (100) female patients of (18-45 years) age presenting to the outpatient clinic of the dermatology center complaining of non-scarring diffuse hair loss, decrease in hair density or both.

### Exclusion criteria

Infectious diseases of scalp hair, scarring hair loss, patients outside the age limit, patchy hair loss.

From each patient full history was taken which included name, age, address, marital status, chief complaint & duration, triggering factors such as: history of stress, thyroid disease, recent illness, surgical intervention, history of Covid 19 infection, history of hospitalization, hair pulling habit, drug history, history of atopy, family history of hair loss, menstrual and obstetric history, psychiatric history, history of hair cosmetics (keratin) and hair product (hair dye) use.

Examination included general medical examination, full dermatologic examination. Signs of virilization were especially noted if present.

Local examination of scalp was performed looking for scales, crusts, pustules, or seborrhea if present. The color of hair, loss of eye brows or eye lashes was also looked for.

The following bedside tests were performed:

- 1- *Hair pulling test*: around 50-60 hairs were held between the thumb, index and middle fingers and gently pulled, if  $\leq 3$  hairs came this indicates normal and the pulling test is negative. If more than 3 hairs were attained, this is regarded as abnormal, and the patients' hair pull test is positive. If the patient has shampooed within a few hours before the test four or more extracted hairs were considered positive.<sup>5</sup>

- 2- *Twenty four hour hair shed count*: This is a quantitative assessment of hair loss. The patient is instructed to wash her hair many times into a closed sink during 24 hours time. The hairs in the sink were then collected and counted.

- 3- *Hair density count*: by using a dermatoscope. Dermlite DL200 Hybrid; 3Gen Inc. San Juan Capistrano, CA USA was used with a magnification power of 10-folds, viewed through a smart phone connected to the dermoscope via the universal smart phone adapter. Three sites were examined; the vertex, the left and the right temporal areas (6 centimeters above the ear). Hairs in one square centimeter were counted.

Dermatology Life Quality Index (DLQI) was assessed: the original DLQI was modified to include hair, instead of skin and was translated to Arabic, the list included 8 questions concerning patients' perception of impact of hair loss on different aspects of their health related quality of life over the last week and scored from 0-3. The total ranged from 0-24.

The DLQI interpretation was: Large effect 11-24, Moderate effect 6-10, Small effect 2-5, No effect 0-1.

The following investigations were done; hemoglobin, serum ferritin level and thyroid function tests.

### Results

The most common age was < 25 years (46%), followed by the age 25-35 (35%) then the age > 35 years (19%). The most common chief complaint was diffuse hair loss (89%) while 8% complained mainly from decrease hair density.

The most common diagnosis was telogen effluvium (86%), followed by androgenic alopecia (7%), then alopecia areata (3%), trichotillomania (3%) and anagen effluvium (1%).

Family history was positive in 45%. Regarding predisposing or associated factors 30% had previous COVID-19 infection during the last year, 28% had

history of using hair products, 22% had history of stress, 19% had irregular menstrual cycle, history of hair pulling habit was positive in 15%, while 7% had previous surgeries during the preceding year, 6% had hypothyroidism, 4% had history of atopy and 3% had psychiatric history (depression). The results of the general examination of the patient and locally of the scalp are shown in **Table 1**.

Results of hair pull test, 24 hours' hair count, hair density are presented in **Table 2** and **Figure 2**.

Patients' DLQI is shown in **Figure 3** and the result of the investigations is shown in **Table 3**.

A comparison between telogen effluvium and androgenetic alopecia is shown in **Table 4**.

**Table 1** Clinical examination (general and local scalp).

Variable	No. (n= 100)	Percentage (%)
General examination		
Pallor	14	14.0
Hirsutism	2	2.0
Vitiligo	1	1.0
Local examination		
Scale	30	30.0
Erythema in scalp	4	4.0
Density test (Vertex) n= 97		
≤ 90	73	75.3
> 90	24	24.7
Density test (Left temporal) n= 97		
≤ 90	68	70.1
> 90	29	29.9
Density test (Right temporal) n= 97		
≤ 90	68	70.1
> 90	29	29.9

**Table 2** Hair pull test, 24 hours shed hair count hair density (expressed as mean±SD).

	Mean ± SD	Range
Pull test (No. of hair)	5.7±2.9	3.0–20.0
24 hours hair shed count	157.22±139.0	21.0–700.0
Density test (Vertex) (Hair/cm <sup>2</sup> )	80.47±19.05	40.0–150.0
Density test (L) (Hair/cm <sup>2</sup> )	82.23±18.85	40.0–144.0
Density test (R) (Hair/cm <sup>2</sup> )	83.19±18.8	42.0–150.0



**Figure 1** Telogen effluvium in 29 years old female.



**Figure 2** Hair density per square centimeter for 29 years old female with telogen effluvium are: vertex 68, Lt. temporal 74, Rt. temporal 78 hairs/cm<sup>2</sup>.

## Discussion

Scalp hair has an important psychological and social effects on women. Loss of hair leads to impaired quality of life and social functioning.<sup>2</sup>

In the present study diffuse hair loss was the most common complaint in women, a view also shared by most investigators.<sup>1,3,4</sup>

The role of stress as an exacerbating factor in the present study was less than previous literature.

**Table 3** Investigation results.

Variable	Number of patients	Percentage
<b>Hemoglobin (gm/dl)</b>		
< 12	45	45.0
≥ 12	55	55.0
Mean±SD (11.57±1.2); Range (12.0 – 14.0)		
<b>T3 (nmol/l)</b>		
Abnormal	66	66.0
Normal	34	34.0
Mean±SD (1.57±0.89); Range (0.79–1.58)		
<b>T4 (nmol/l)</b>		
Abnormal	19	19.0
Normal	81	81.0
Mean±SD (9.64±3.16); Normal Range (4.9–11)		
<b>TSH (mIU/l)</b>		
Abnormal	44	44.0
Normal	56	56.0
Mean±SD (3.36±1.34); Normal Range (3.34–5.14)		
<b>S. Ferritin (µg/l)</b>		
< 40	54	54.0
≥ 40	46	46.0
Mean±SD (41.62±27.3); Normal Range (30–300)		



**Figure 3** Androgenic alopecia in 42 years old female: widening of the central part with translucency of hairs at its border with preservation of anterior hair line.

Only (22%) complained of stress. While stress was mentioned as an important factor by Kinoshita *et al.* and Snehal *et al.*<sup>4,5</sup>

History of Covid 19 infection was mentioned in 28% and all were diagnosed with TE. None of patients with androgenic alopecia gave history of Covid 19 infection. This finding is consistent with the result of Nguyen and Tosti *et al.*<sup>6</sup> who stated that unlike patients



**Figure 4** Hair density per square centimeter for 42 years old female with androgenic alopecia are: vertex 66 hairs/cm<sup>2</sup>.

with androgenic alopecia, who all had a preexisting diagnosis of the condition, no patients with telogen effluvium had a preexisting diagnosis prior to COVID-19.

Hair density test in the present study showed lowest count in androgenic alopecia, the vertex 80.47±19.05 hair/cm<sup>2</sup> in comparison to left temporal area 82.23±18.85 hair/cm<sup>2</sup> and right temporal area 83.19±18.8 hair/cm<sup>2</sup>. In TE the lowest hair density was also in vertex. These results are different from Leerunyakul and Suchonwait who found the highest hair density in Thai subjects was observed in the vertex area (162.9±15.7 hair/cm<sup>2</sup>), followed by the occipital (160.2±15.3 hair/cm<sup>2</sup>), frontal (154.3±12.8 hair/cm<sup>2</sup>), and temporo-parietal areas (133.7±14.6 hair/cm<sup>2</sup>).<sup>7</sup>

Hairs shed over 24 hours were counted. The number of hairs was 164.1±143.6 for telogen effluvium which was higher than androgenic alopecia (109.42±85.3). Li *et al.* also found a greater number of shed hairs in telogen effluvium (125.5±62.7) compared to androgenic alopecia patients (52.2±28.5). They used "Refined Wash Test". The subjects were instructed to spread a piece of filter cloth with light color over the sink, then shampoo and rinse with flowing water above a sink covered with the filtering cloth. All hairs entrapped in the filtering cloth were air dried, and then

**Table 4** Comparison between TE, AGA regarding general, local scalp examination.

Variable	Diagnosis		Total (%) n= 93	P-Value
	TE (%) n= 86	AGA (%) n= 7		
<i>General examination</i>				
Normal	71 (92.2)	6 (7.8)	77 (82.8)	0.916
Pallor	13 (92.9)	1 (7.1)	14 (15.1)	
Other	2 (100.0)	0 (0)	2 (2.2)	
<i>Local examination</i>				
Normal	49 (90.7)	5 (9.3)	54 (58.1)	0.587
Scale	27 (93.1)	2 (6.9)	29 (31.2)	
Other	10 (100)	0 (0)	10 (10.8)	
<i>Density test (Vertex)</i>				
≤ 90	62 (89.9)	7 (10.1)	69 (74.2)	0.104
> 90	24 (100.0)	0 (0)	24 (25.8)	
<i>Density test (Left temporal)</i>				
≤ 90	58 (90.6)	6 (9.4)	64 (68.8)	0.315
> 90	28 (96.6)	1 (3.4)	29 (31.2)	
<i>Density test (Right temporal)</i>				
≤ 90	58 (90.6)	6 (9.4)	64 (68.8)	0.315
> 90	28 (96.6)	1 (3.4)	29 (31.2)	
Duration of complaint (Month)	9.02 ± 4.0	10.71 ± 3.4	0.25	
Pull test (no. of hair)	5.54±2.3	7.85 ± 6.1	0.356	
24 hrs. hair count	164.1±143.6	109.42±85.3	0.161	
DLQI	7.29±5.0	9.57±4.9	0.275	

collected and placed into small zip lock plastic bags labeled with name and date. This “wash-and-collect” process was repeated for 3 consecutive days with a 24±2 hour interval between every two shampooings.<sup>8</sup> This differs from our hair counting practice.

In the present study 35% had large effect on patient life, 26% moderate effect, 30% small effect and 9% no effect. In TE the mean DLQI was (7.29±5.0) and in androgenic alopecia it was (9.57±4.9). These findings are different from Lalu *et al.* who found that the majority (66%) had moderate effect on the DLQI followed by 26% with severe effect and 8% with a mild effect on the.<sup>9</sup>

Anemia has been mentioned as important factor in diffuse hair loss in young females (<25 years) especially in chronic TE. In the present study, Hemoglobin <12 mg/dl was recorded in 45 patients (45%), Karakoyun found that hemoglobin was below reference range in 11.1% of their patients while serum ferritin was low in 46.5% of the patients.<sup>10</sup>

In the present study 6% were previously diagnosed with hypothyroidism while after investigation hyperthyroidism was diagnosed in 20% of our patients, hypothyroidism in 2 patients and secondary hypothyroidism (due to pituitary gland failure) in one patient. Thyroid disease is mentioned by most investigators on diffuse hair loss in women.<sup>1-3</sup> Snehal *et al.* found thyroid dysfunction in 8% of their female patients who complained from non-cicatricial diffuse alopecia.<sup>5</sup>

Regarding treatment of hair loss: PRP can be used as a new therapeutic option for hair loss including androgenetic alopecia and female pattern hair loss.<sup>6</sup>

Exosomes are lipid bilayer vesicles, Because the growth and cycling of hair follicles are governed by interactions between hair follicle stem cells (HFSCs) and dermal papilla cells (DPCs), a better understanding of the mechanisms responsible for hair growth and cycling through exosomes may provide new insights into novel treatments for hair loss, Exosomes and their components, such as microRNAs, are promising drugs for effective hair loss treatment.<sup>12</sup>

Hair transplantation is a surgical procedure used to restore hair in areas of thinning or baldness by relocating follicular units from a donor site, typically the occipital scalp, to recipient areas, most commonly performed for androgenetic alopecia.<sup>13</sup>

### Conclusion

The most common diagnosis for hair loss in females of reproductive age was telogen effluvium followed by androgenetic alopecia, hair loss have many etiological factors. Detailed history, general, local scalp examinations and investigations show many types of hair loss and may show also the association factors.

**Declaration of patient consent** The authors certify that they have obtained all appropriate patient consent.

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**Conflict of interest** The authors affirm that they have no conflicts of interest to disclose.

#### Author's contribution

**HO, HA:** Have made substantial contributions to conception and design, acquisition of data, analysis and interpretation of data. Have been involved in drafting the manuscript and revising it critically for important intellectual content.

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