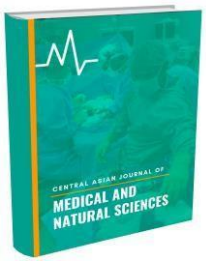

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*Article*

# Evaluation of Hair Loss and Some Physiological Factors in Female's Patients Attended Dermatological Clinics at Ramadi General Hospital.

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**Abstract:** Hair loss is a difficult problem that is common to many 'dermatologists'. It is also considered an annoying trouble for females due to the relationship between hair within femininity, beauty and individual strength, and therefore it may cause psychicl trouble for them. especially in the city of Ramadi (Western Iraq), (, there was little attention to it. The study aimed to Validating role of the main physiological of the common causes of hair loss. The study was conducted during the period from March to September, 2022. This study was applied on 80 volunteer women who visited the dermatology clinics in general Ramadi hospital. The blood sample was collected from the patient group (A total of 52 volunteer women with suffering hair loss), along with the control group (28 healthy women) for the purpose of comparison. Serum T3, T4, TSH, Vit D3 and Ferritin level measured by using the Cobase 411(Roche) full –automated mechanics. The result showed 'a significantly lower' level in the concentration of vitamin D3, vitamin B12 and serum ferritin and a significant higher mean in serum concentration of T3 hormone in the group of patients. Additionally, the results exhibited non a significantly different in age, Hb, T4 and TSH of patient group compared to the control group. This study demonstrated the importance of physiological factors might play a major role in the etiology of hair loss between women in the city of Ramadi.

**Keywords:** Hair loss, Thyroid gland hormones, Vitamins, Zinc, Ferritin, Iron.

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## 1. Introduction

Many people of all ages consider healthy hair a sign of health or beauty. Therefore,hair loss among females can cause more psychological problems than males. (1) In general, hair loss is a problem that affects hair in different stages of life, due to many reasons, including hormonal disorders, nutrition and additional factors that influence hair growth, including choice of lifestyle, chronic illnesses and stress exposure. General, these reasons effect on the cycle of hair growth directly and too makes the roots of hair further weakly. (2)

Prevalence the hair loss among Iraqi females are unspecified but in developed countries it affects more than 25% of females. (3)Many types of hair loss in females, the

most common are telogen hair loss (telogen effluvium). [4] Vastly of potential factors that causes TE nutrition, severe bleeding, malnutrition and thyroid disease. [5.6]

Maintain healthy hair certain proportions of some nutrients are needed (nutrition). [7] Vitamin D (25- hydroxyl vitamin D3) has a great effect on a wide number of cells in the human body, including skin cells and hair follicles. [8] Diffuse hair loss returns to the inhibit of any body of the stages of hair cycle:' anagen' (active growth stage), 'catagen' (stage of involution), 'telogen' (resting stage) and exogen is essentially an extension or part of the 'telogen' stage. Loss about 10% -15% of the total scalp hair (100000 hairs) is the 'telogen' stage. Lost about 100-150 telogen is count normal ,however loss of hair in 'anagen phase is abnormal.[9] Vitamin D receptor(VDR) affects the hair follicle in anagen stage by stimulatory the hair follicle to grow.[10,11] One of the problems of vitamin D deficiency in hair includes hair loss and lack of growth due to weak hair follicles.[12,13] In study of Rasheed *etal*[14] (2013) discovered a connection between telogen hair loss and a drop in the amount of 25 hydroxyvitamin D3 in women's serum, and androgenic hair loss. Trace elements such as Zinc ($Zn^{+2}$) is an essential element plays a role in biological functions and cofactor for many activities enzymatic and has functional activities within hair follicles, through the accelerate hair repair, and it is a potent inhibitor of hair follicles decrease, as well role in maintaining the fatty gland (sebaceous gland) linked to hair follicles.[3,15] In 2009 H. Park et al[16] findings indicated the clear relationship between $Zn^{+2}$ deficiency and all type of hair loss in patients.

Many different types of endocrine disorders may play a role in hair loss, including thyroid disorders. 'Thyroid gland' excretion biologically potent two hormones (T3, T4) which play important roles in growth differentiation, metabolism, regulating skin cell restoration and growth of hair. [3] 'Thyroid' disorders such like decreased thyroid hormones and increased thyroid hormones are linked with 'hyperpigmentation', the structure of hair and its function. Excessive telogen rate changes the diameter, dryness, brittle, coarse hair and decreased in hair bulb cell proliferation and eventually loss of hair in hypothyroidism. [17] Several recent studies were conducted in 2021 and 2020 by Mazhar [18], Kareem et al [3] revealed that thyroid abnormalities are relationship with an alter in the human skin, the structure and role of hair. Also little iron stores are one of a contributing factor for hair fall. Therefore, the hemoglobin and ferritin amount can be a measure to screen iron loss so serum ferritin estimated is recommended as a part of rote investigation in dermatology clinics. [19] Another studies were conducted in 2015,2011by Ozuguz etal [20], Coad and Conlon [21] confirmed during it the correlation between blood markers and hair loss. Their results revealed a significant low in HGb concentration, MCV, MCH, iron and vitamin B12 in samples of blood the females with hair loss comparison with the healthy females.

The study examined the main physiological reasons of hair loss at the city of Ramadi, as some vitamins, minerals and hormones play a role in influencing the prevalence of hair loss among women at the city of Ramadi.

## 2. Materials and Methods

A descriptive case- control study was carried out in a private dermatology clinic in Ramadi city, Iraq through the period from March to September, 2022. The informed consent written was obtained from all the subjects. The participants were divided into two groups. The first was the patient group, which included 52 women with suffering hair loss (age range: 19–47 years) who were referred by a private dermatology clinic. The second group was the control group, which included 28 women who presented to the same dermatology clinic for another complaint (age range: 27–44 years).

The investigations (Hb, T3, T4, TSH, Vit.D3, Vit.B12, S. Iron, S. Ferritin and S. Zinc) were done in a private laboratory in Ramadi city. Serum T3, T4, TSH, Vit D3 and Ferritin level measured by using the Cobase 411(Roche) full –automated mechnics, which is a quantitative check for the determination of this marker in human blood. Serum

concentration of Iron and zinc levels were determined by using the Cobas c111(Roche) full-automated.

Blood parameter including hemoglobin (Hb) was measured, by using the hematology analyzer (Sweden). Mindray CL-960i fully automatic was used to determine the level of Vitamin B12. The system of Statistical analysis included the results were estimated by using mean, standard deviation (± SD), two extreme values (upper and lower limits), and variance analysis. At " p-value 0.05", the discrepancy among the biomarkers was considered to be statistically significant.

## 3. Results

**Descriptive of study group**

The case-control study included a total of eighty volunteer women, 52 out of 80 women were suffering hair loss and 28 were control group. Descriptive data of the patients and control groups were presented in Table 1 and 2.

The control group, were aged between 27 and 44 years (mean ± SD =34.64 ± 5.29 years) (Table 1), and the patient group, were aged between 19 and 47 years old (mean ± SD = 33.80 ± 9.20 years) (Table 2). Thus, overall, the two groups did not vary significantly with respect to age (p = 0.66) (Table 3).

**Determination of Zinc levels in serum**

The zinc levels in the serum of control women group ranged between 69.00 and 121.00 (mean ±SD= 93.82 ±15.52) (Table1). Likewise, the levels of zinc in the serum of patient women group ranged between 38.00 and 121.00 (mean ±SD= 82.59 ± 22.47) (Table2).

**Determination of hemoglobin levels in blood**

The levels of Hemoglobin in the blood of control women group ranged between 10.12 gm/dl and 13.40 gm/dl (mean ±SD= 10.37 ±3.39854 gm/dl) (Table1). Likewise, the levels of Hemoglobin in the blood of patient women group ranged between 7.30 gm/dl and 14.70 gm/dl (mean ±SD=11.23 ±2.18056 gm/dl) Table 2. Thus, general, the both groups did not vary significantly with hemoglobin (p =0.174) (Table 3).

**Determination of iron and ferritin levels in the serum**

The Iron and Ferritin levels in serum of control women group ranged between 52.40 and 123.00, 23.56 and 208.00 respectively (mean ±SD=**90.83±20.62, 121.66±55.33** respectively) (Table1). Further, the levels of Iron and Ferritin in serum of patient women group ranged between 22.67 and 123.00, 2.10 and 321.00 respectively (mean ±SD=69.28 ± 27.61, 48.16±29.76 respectively) (Table 2).

**Determination of levels of T3 hormone in serum**

The T3 levels of hormone in serum of control women group ranged between 0.80 and 1.50 (mean (mean ±SD= 1.10±0.20) (Table 1). On the other hand, the levels of T3 hormone in serum of patient women group ranged between 0.56 and 6.30(mean ±SD=3.75±1.63) (Table 2)

**Determination of T4 and TSH hormone levels in serum**

The levels of T4 and TSH hormone in serum of control women group ranged between 60.00 and 140.00, 0.50 and 4.10 respectively (mean ±SD=97.37±25.24285 and 1.4161±.91248 respectively) (Table 1). Further, the levels of T4 and TSH hormone in serum of patient women group ranged between 0.50 and 160.00, 0.30 and 6.78 respectively (mean ±SD=89.27±39.675 and 1.04±1.096 respectively) (Table2). Thus general, the both groups are same significantly with respect to T4 and TSH hormone (p =0.331, 0.133 respectively) (Table 3).

**Determination of vitamin D3 and B12 levels in serum**

The levels of vitamin D3 and B12 in serum of control women group ranged between 30.00 and 100, 140.00 and 902.00 respectively (mean ±SD=62.72±22.99 and 43250±.165.60 respectively) (Table 1). otherwise, the levels of vitamin D3 and B12 in serum of patient women group ranged between 7.89 and 45.00, 59.00 and 557.00 respectively (mean ±SD=22.52±10.08 and 242.19±134.95 respectively) (Table 2).

Comparison between the levels of physiological factors in blood and serum in women in study group in table 3 no significant difference in age, Hb, T4 and TSH were observed among women with suffering loss of hair and control group (p=0.66,0.174,0.331 and 0.133) respectively. Zinc concentration and iron in the serum of women with hair loss decreased significantly (p=0.021, 0.001 respectively), it was (82.5923± 22.47233 mg/dl and 69.28±27.61mg/dl respectively) in comparing with the control group (93.82± 15,52mg/dl, 90.83± 20.62 µg/dl respectively).

As shown in (Table 3), the serum level of T3 hormone (3.75 ± 1.63 ng/ml) was significant high (p< 0.001) in women with hair loss than in control group (1.10 ± 0.20ng/ml).

Table 3 exhibited the concentration of vitamin d in females with hair loss and control women. A significant lower level (P<0.001) of vitamin D3 was estimated in women with loss of hair which limited to 22.52 ng/ml, than in control women, which was 62.72 ng/ml. Similarly, vitamin B12 concentration showed a lower significantly (P<0.001) in women with hair loss than in women at control group. As shown in table 3

A significant dismiss (P<0.001) was detected in the concentration of ferritin in women with hair loss (48.16±29.76 ng/ml) in comparison with women at control group (121.66±55.33 ng/ml) (Table 3).

**Table (1)** Descriptive statistic of Control group for all parameters.

| | N | Minimum | Maximum | Mean | St. E | ± St. D |
|---|---|---|---|---|---|---|
| Age year | 28 | 27.00 | 44.00 | 34.6429 | 1.00028 | 5.29300 |
| Zinc mg/dl | 28 | 69.00 | 121.00 | 93.8214 | 2.93404 | 15.52550 |
| Hb gm/dl | 28 | 10.12 | 13.40 | 10.3764 | .64226 | 3.39854 |
| Iron mg/dl | 28 | 52.40 | 123.00 | 90.8350 | 3.89704 | 20.62120 |
| T3 ng/ml | 28 | .80 | 1.50 | 1.1089 | .03926 | .20776 |
| T4 mmol/l | 28 | 60.00 | 140.00 | 97.3714 | 4.77045 | 25.24285 |
| TSH ng/ml | 28 | 0.50 | 4.10 | 1.4161 | .17244 | .91248 |
| Ferritin ng/ml | 28 | 23.56 | 208.00 | 121.6668 | 10.45710 | 55.33379 |
| Vitamin B12 pg/ml | 28 | 140.00 | 902.00 | 432.5000 | 31.29614 | 165.60361 |
| Vitamin D3 ng/ml | 28 | 30.00 | 100.00 | 62.7254 | 4.34485 | 22.99079 |

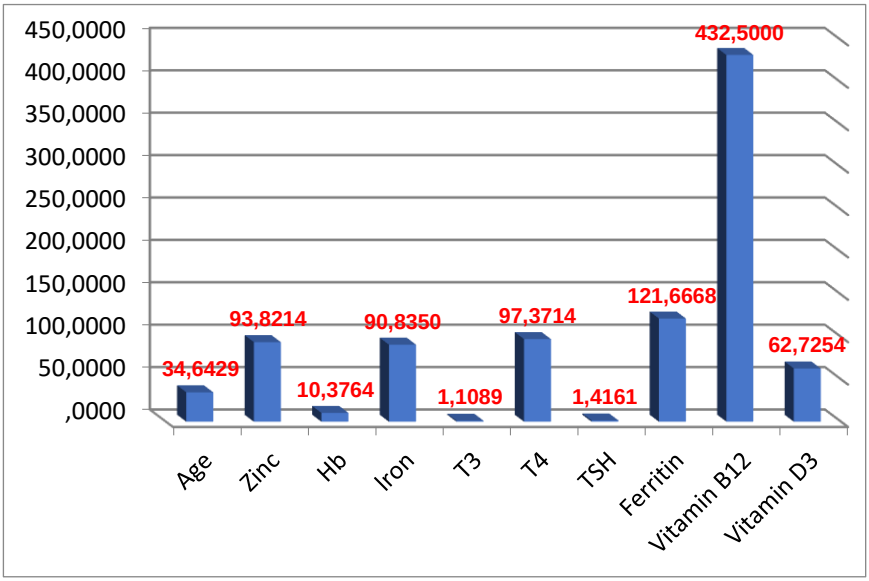

**Figure 1:** Descriptive statistic of Control group for all parameters

**Table (2)** Descriptive statistic of Patient group

| | N. | Minimum | Maximum | Mean | St. E | ± St. D |
|---|---|---|---|---|---|---|
| Age year | 52 | 19.00 | 47.00 | 33.8077 | 1.27661 | 9.20579 |
| Zinc mg/dl | 52 | 38.00 | 121.00 | 82.5923 | 3.11635 | 22.47233 |
| Hb gm/dl | 52 | 7.30 | 14.70 | 11.2346 | .30239 | 2.18056 |
| Iron mg/dl | 52 | 22.67 | 123.00 | 69.2844 | 3.82975 | 27.61668 |
| T3 ng/ml | 52 | .56 | 6.30 | 3.7544 | .22610 | 1.63046 |
| T4 mmol/l | 52 | .50 | 160.00 | 89.2731 | 5.50195 | 39.67514 |
| TSH ng/ml | 52 | .30 | 6.78 | 1.0467 | .15211 | 1.09686 |
| Ferritin ng/ml | 52 | 2.10 | 321.00 | 48.1669 | 9.67474 | 29.76556 |
| Vitamin B12 pg/ml | 52 | 59.00 | 557.00 | 242.1923 | 18.71427 | 134.95054 |
| Vitamin D3 ng/ml | 52 | 7.89 | 45.00 | 22.5227 | 1.39830 | 10.08329 |

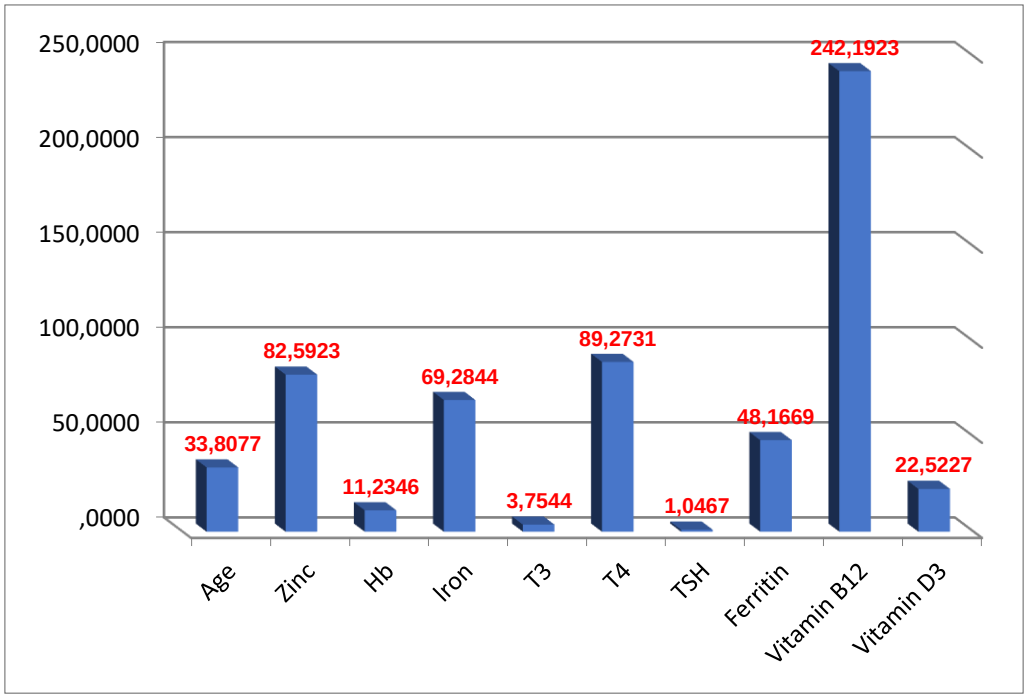


**Figure 2:** Descriptive statistic of Control group for all parameters

**Table (3)** T-test between control and patient of groups

***P<0.05 Significant**

| | Study groups | N | Mean | ± St. D | SE | P-value | Sig |
|---|---|---|---|---|---|---|---|
| **Age Years** | **Control** | **28** | **34.6429** | **5.29300** | **1.00028** | **0.66** | **NS** |
| | **Patients** | **52** | **33.8077** | **9.20579** | **1.27661** | | |
| **Zinc mg/dl** | **Control** | **28** | **93.8214** | **15.52550** | **2.93404** | **0.021** | **S** |
| | **Patients** | **52** | **82.5923** | **22.47233** | **3.11635** | | |
| **Hb gm/dl** | **Control** | **28** | **10.3764** | **3.39854** | **.64226** | **0.174** | **NS** |
| | **Patients** | **52** | **11.2346** | **2.18056** | **.30239** | | |
| **Iron mg/dl** | **Control** | **28** | **90.8350** | **20.62120** | **3.89704** | **0.001** | **S** |
| | **Patients** | **52** | **69.2844** | **27.61668** | **3.82975** | | |
| **T3 ng/ml** | **Control** | **28** | **1.1089** | **.20776** | **.03926** | **0.000** | **HS** |
| | **Patients** | **52** | **3.7544** | **1.63046** | **.22610** | | |
| **T4 mmol/l** | **Control** | **28** | **97.3714** | **25.24285** | **4.77045** | **0.331** | **NS** |
| | **Patients** | **52** | **89.2731** | **39.67514** | **5.50195** | | |
| **TSH ng/ml** | **Control** | **28** | **1.4161** | **.91248** | **.17244** | **0.133** | **NS** |
| | **Patients** | **52** | **1.0467** | **1.09686** | **.15211** | | |
| **Ferritin ng/ml** | **Control** | **28** | **121.6668** | **55.33379** | **10.45710** | **0.000** | **HS** |
| | **Patients** | **52** | **48.1669** | **29.76556** | **9.67474** | | |
| **Vitamin B12 pg/ml** | **Control** | **28** | **432.5000** | **165.60361** | **31.29614** | **0.000** | **HS** |
| | **Patients** | **52** | **242.1923** | **134.95054** | **18.71427** | | |
| **Vitamin D3 ng/ml** | **Control** | **28** | **62.7254** | **22.99079** | **4.34485** | **0.000** | **HS** |
| | **Patients** | **52** | **22.5227** | **10.08329** | **1.39830** | | |

****P>0.05 Non significant**

*****P<0.001 High significant**

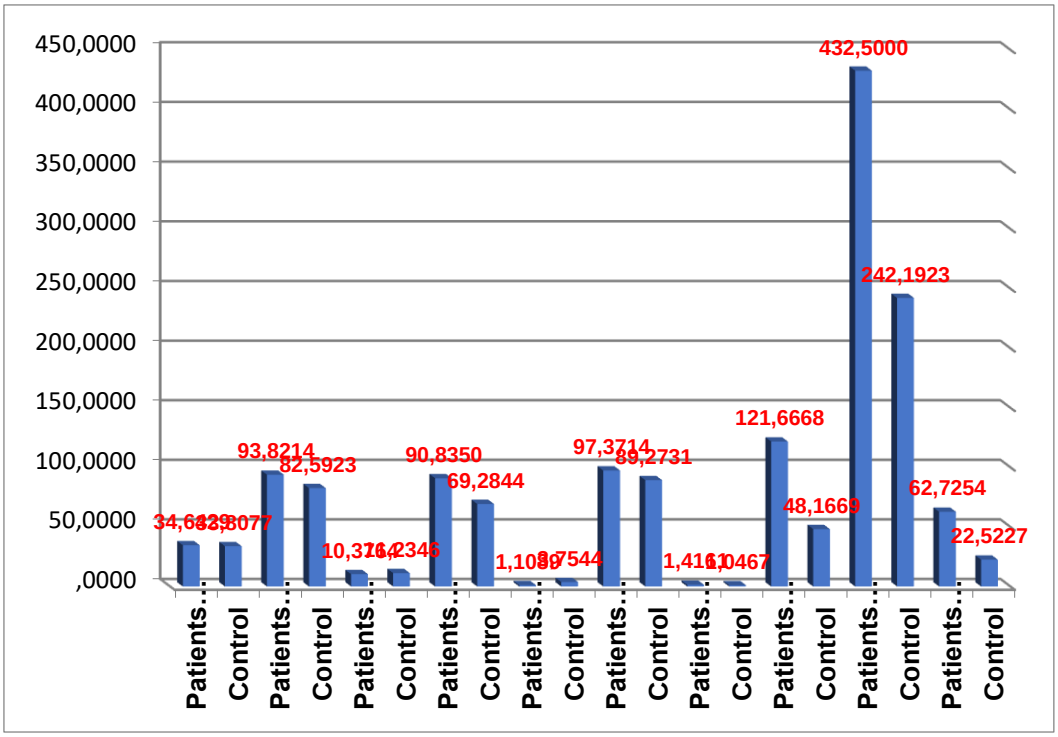


**Figure (3):** T-test between control and patient of groups.

## 4. Discussion

Hair loss is a common problem; in Iraq especially in the city of Ramadi in western Iraq, there was little attention to it. In current study a sample of women only one has been compared with age range 19-47 years old and after data analysis, the results of present study concluded Age had no significant effect on hair loss. This study showed no statistical significance difference (P=0.66) between the mean age of studied groups. These findings agree with the results found by. [12] [22] The hair loss may occur at all ages. Therefore, loss of hair becomes a problem of concern in all individuals irrespective of age and sex. [12] [22]

This study showed a significant difference in mean zinc between patient and control group (p=0.021). Control group have higher zinc level (93.82 mg/dl) compared to patient group (82.59 mg/dl) and these result agree with that of. [23,24,16]

zinc deficiency may occur due to poor meat using up other causes of zinc deficiency contain anorexia nervosa.[23] Indicated some studies the role of zinc in function activities within hair follicles and it also accelerate the re-growth of follicles.[24] H. park et al, 2009[16] found that the zinc participate in most all metabolism operation that happen within the body, works as coenzymes and therefore zinc deficiency may affect hair growth and interrupt cycle of hair follicles it causes hair loss.

The study's findings demonstrated that the control group's serum iron and ferritin levels were significantly higher (90.83 mg/dl, 121.66ng/ml respectively) than that women with hair loss (69.28mg/dl, 48.16 ng/ml respectively) this result agree by [25,26].

In fact, low serum ferritin levels, it causes iron deficiency in women prone to hair loss. Iron deficiency, however, most likely causes hair loss in a different way. The role of iron as a cofactor of the ribonuclotide reductase enzyme in hair stem cells can be used to interpret this. [27]

The mean level of vitamin D3 in the patient group was (22.5227 ng/ml) and was (62.7254 ng/ml) in control group. Vitamin D3 level during women hair loss was significantly decrease than that during control group (P= 0.000 table 3) this matched with [12,28]. This result supported most studies show an opposite relationship between serum

vitamin D3 levels and any type of hair loss. Vitamin D3 plays an intricately in different signaling pathways of hair follicle growth and differentiation. However, there are no other research studies to prove the benefit of vitamin D3 administration in evaluating hair loss and managing these states [29, 30].

The concentrations of vitamin B12 were found significantly decrease in the patient group (242.19± 134.95Pg/mL) (p =0.000) this agree by Ertug and Yilmaz[31], they found significantly decreased vitamin B12 level in the patient group compared to that in the healthy group (232.13±123.35 vs. 306.41±182.28 pg/mL, p<0.001). The function of vitamin B12 in nucleic acid synthesis suggests that they might play a role in the proliferative follicle of hair. However, few studies to date have addressed the relationship between B vitamins and loss of hair. [23]

This study showed no statistical significance difference (P=0.331 ,0.133 respectively) between the mean T4 and TSH hormones of studied groups(Table 3) .while The results of this study showed that serum T3 hormone was significantly higher in patient group (3.75 ng/ml) compared to control group (1.10 ng/ml)These findings disagree with the results found by.[31] When occur disorder in the thyroid hormones , specifically of hormones T3 and T4 (increase or decrease), it affects the other function in the body. This involved the growth of hair at the root. Hair falls out and may not be substitute by new growth, resulting in thinning across your scalp and other areas such as your eyebrows [32, 33,34]

## 5. Conclusion

This study demonstrated the importance of physiological factors might play a significant contributing a major role to the etiology of hair loss between women residing in Ramadi.

## 6. Study recommendations

Despite the high prevalence of hair loss in females, it's still imposes several difficulties to dermatologists' clinical practice. This study may help physician about the markers and physiological change for hair loss.


## 7. Source of funding

This research did not receive any specific grant from governmental, private, or profit funding organizations conflict of interest :The researchers have disclosed no conflicts of interest.


## 8. Ethical approval

Before starting this work, we obtained approval by the ethical committee at Anbar University/ Dentistry/ Basic science. Each female gave a written consent indicating her agreement to the participate in this work reference no (107) in 17/9/2023.

## 9. Authors contributions

TIM, created and planned the study and made a significant contribution, in conducting the research and writing the original and revised draft. SSM made statistics, plagiarism, and contributed in writing. DAA collected the samples and organizing the study, provided research. NAA contributed to the methods and interpretation in statistical analysis of the data in this study. Correspondence to scientific journals was done by SSN. Every authors have also read and approved the final manuscript.

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