

SERUM LEVELS OF IFN- γ , COMPLEMENT COMPONENT C3 C4 AND VITAMIN D3 IN THE PROGNOSIS OF PATIENTS WITH ALOPECIA AREATA PROSPECTIVE TEACHERS

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ABSTRACT

Background: Alopecia areata is a prevalent autoimmune skin disorder. The current investigation aims to evaluate the function of serum IFN- γ , complement component C3, C4, and vitamin D3 levels in the prognosis of patients with alopecia areata. The blood sample was taken from twenty AA patients and twenty healthy controls. Interferon (IFN- γ) levels in serum were evaluated using the ELISA method, V.D3 was detected using the Roche electrochemiluminescence method, and C3 and C4 were detected using the immunoturbidimetry method. . In the current study observed elevated levels of IFN- γ (299 ± 115.7 Pg/ml), while the control group was lowest 73 ± 10.84 Pg/ml. This finding was highly significantly different (p-value 0.00). The Mean \pm SD Level of components C3 and C4 in the current study were (1.37 ± 0.903) (0.29 ± 0.029) Alopecia Areata cases were not statistically different from the usual range, however vitamin D3 levels were severely deficient. (6.86 ± 4.03) when compared to normal range. Distribution of AA among male was highly observed in age group NO = 10 (50%) 1 - 19years follow by age group NO = 4(20%) 20-39 and (40-50) respectively while Alopecia Areata among females was the lowest distribution.

KEYWORDS

Alopecia Areata, AA, IFN- γ , C3, C4, V.D3, HF.

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1. INTRODUCTION

Alopecia areata is an autoimmune disease of specific – organ that causes nonscarring hair loss by targeting hair follicles. Most frequently observed as circular regions of hair loss, but may also be widespread throughout the entire scalp or body (1). Alopecia areata is categorized as patchy alopecia areata, alopecia areata totalis, and alopecia areata Universalis (2). Several different forms of hair loss can be used to identify it, including: patchy, ophiasis (band-like hair loss in the parieto-temporal-occipital area), ophiasis inversus-sisaipho (band-like hair loss in the fronto-parieto-temporal area), reticulate, and diffuse (2). In the general community, the condition affects between 1% and 2% of people (3,4). Perifollicular and intrafollicular infiltrates, which are mostly composed of CD4+ T helper 1 (Th1) cells and CD8+ cytotoxic T cells, respectively, are features of alopecia areata. (5). The disorder is thought to be an autoimmune, T-cell-mediated disease with a hereditary predisposition and an environmental trigger. (5) Interferon-gamma (IFN-) induce the ectopic expression of MHC class antigens and the over-expression of adhesion molecules in keratinocytes of hair follicles and dermal papilla cells (6). Other reasons include vitamin abnormalities such as excessive retinoic acid and low vitamin D, immune system problems with hair follicle damage, and autoantibodies against tyrosine hydroxylase and retinol-binding protein 4. (7) complement component have been implicated in a variety of autoimmune dermatologic pathologies, including angioedema systemic lupus erythematosus, and blistering diseases

The aim of the study is to investigate the effect of serum IFN-, complement component C3 C4, and vitamin D3 levels in the prognosis of patients with alopecia areata.

2. MATERIAL AND METHOD

2.1. STUDY DESIGNED

This study was conducted at the dermatology department of al Nasiriya teaching hospital in Iraq Thi Qar from January 2022 to May 2022., The study included 20 patients with AA and 20 healthy individuals as a control for all data of age ,and gender . Family history, exposure to some chemical substances were recorded in our study . All patients were diagnosed with AA based on clinical signs, medical history and dermoscopic examination . Patients diagnostic with fungal examination or signs of bacterial infection and patients with a history of using systemic or topical treatment within the one month were excluded from the study.

2.2. SAMPLE COLLECTION

A total of 4 ml of blood was drawn from the controls and patient groups. Blood samples were centrifuged at 4000 R.P.M and sera were stored at -20 C°. were obtained from all the Patients for (IFN- γ , C3 , C4 ,V.D3 assay) .

2.3. ALOPECIA AREATA -RELATED BIOMARKERS

Complement C3, C4 , IFN- γ , V.D3 were measured in both case and controls group. ELISA Technique detected IFN- γ according to the manufacturer's instructions. Complement component V.D3 were detected by the Roche electrochemiluminescence method. C3, C4 were detected by immune turbidimetry method.

2.4. STATISTICAL ANALYSIS

The data were analyzed using description statistic (mean and standard deviation) independent sample t test the level significant was set at $p < 0.05$ SPSS (Statistical Packing for Social Sciences) version 20

3. RESULT

3.1. AGE GROUP OF PATIENTS INCLUDED IN THE STUDY.

The current study comprised forty patients with Alopecia Areata; the male age group had the highest prevalence of A A. NO = 10 (50%) 1 – 19 years follow by age group NO = 4(20%) 20-39 and (40-50) respectively while Alopecia Areata among females was lowest distribution as shown in Table 1.

Table 1. Show distribution of Alopecia Areata among males and females for different age group.

Patients	No = 20			
Gender	Males		Females	
Age group	Frequency	Percent (%)	Frequency	Percent (%)
1 - 19	10	50%	2	10%
20-39	4	20%	1	5%
40-50	3	15%	0	0%
Total	17	85%	3	15%

3.2. DISTRIBUTION OF C3, C4 AND V.D3 AMONG ALOPECIA AREATA CASES

The Mean \pm SD Level of complement components C3 and C4 in the current study were (0.37 \pm 0.103) and (0.09 \pm 0.029) show within the range of normal value in Alopecia Areata cases while the level of vitamin D3 recorded sever deficiency (6.86 \pm 4.03) when compared to the normal range as showed in below table.

Table 2. Distribution of C3, C4 ,and V.D3 among Alopecia Areata cases.

Patients	C3	C4	Vitamin D3
NO=20	(1.37±0.903)	(0.29±0.029)	6.86±4.03
Normal Range	(0.9-1.8)g/L	(0.1-0.4) g/L	Deficiency : < 10 Insufficiency: 10 – 30 ng/ml Sufficiency : 30 - 100

3.3. MEAN ± SD SERUM LEVELS OF IFN- γ IN CONTROLS AND PATIENTS GROUP.

The level of IFN- γ in patients was 299±115.7 **Pg/ml**, this value showed to be in AA while the control group was 73±10.84 **Pg/ml**. This funding was highly significantly different (p-value 0.00) as shown in table (4.3).

Table 3. The mean level of interferon_ gamma inpatient controls health group .

	No	IFN- γ Pg/ml	P value
Patients	20	299±115.7	0.00
Controls	20	73±10.84	
Total	40		

3.4. THE MEAN±SD OF COMPLEMENT COMPONENT (C3 AND C4) , IFN- γ AND V. D3 AMONG CASES GROUP.

The Mean±SD level of C3 and C4 were not a significantly different level of C3 , C4 current study than the normal range, the Mean±SD level of **IFN- γ** for A A was significantly higher when compared to the control healthy group, however the mean SD level of vitamin D3 in the cases group was lower when compared to the normal value, and the gap between cases and controls was acceptable. **P value=0.00**

Biochemical test	C3	C4	V.D3	IFN- γ	
				C a s e group	Controls group
Value	(1.37±0.903)	(0.29±0.029)	6.86±4.03 ng/ml	299±115.7 pg/ml	73±10.84 pg/ml
Normal range	(0.9-1.8)g/L	(0.1-0.4) g/L	Deficiency : < 10 Insufficiency: 10 – 30 Sufficiency : 30 - 100		
P value	0.00				

4. DISCUSSION

4.1. DEMOGRAPHIC PROPERTY

Individuals with AA showed higher levels of IFN-, C3, and C4 in their blood, while having severe V.D3 insufficiency, according to the current study.. Comparison of the values in the normal range in AA patients. case-control research was conducted to identify the relationship between regulation of the IFN-, C3, and C4 of AA as it relates to age groups. According to Alkhalifah (1), who found that 60% of patients are under the age of 20 at initial presentation, and patients with ages 1 to 19 had a higher risk of AA.

4.2. IFN- γ

Is one sort of proinflammatory process that, among other things, robs dermal papilla cells of their capacity to sustain anagen hair development. It causes various types of cytokines to be produced at the site of inflammation. perifollicular or follicular antigen-presenting cells. (8) We discovered a considerably elevated level of IFN- in our study, and this finding was in agreement with research done by (9) that confirmed E. Arca's findings that patients with AA had considerably higher blood levels of IFN-, (10) Research demonstrated considerably increased serum IFN- levels in individuals with alopecia totalis or alopecia universalis compared to controls, However, there is no discernible difference in IFN- levels between individuals with localized alopecia areata and those with more severe types. Damage to hair follicles (HF) is mediated by IFN- (11) IFN- γ can induce another cytotoxic effector molecule, inducible nitric oxide synthase iNOS (12) . CD4+ Th1 mediated response aberrantly expressed IFN- γ in alopecia areata . Despite the aforementioned, individuals with severe types of alopecia areata may have higher blood levels of the inflammatory protein IFN-, which might indicate the existence of inflammation. Serum IFN- levels may be used as a prognostic sign or to distinguish between those who are more prone to develop alopecia universalis and those who just have the local condition. It is suggested that future study will be able to measure how IFN- levels fluctuate in people who undergo spontaneous regression or disease progression. (10).

4.3. COMPLEMENT COMPONENT C3 AND C4.

Complement is important in the development of AA., Our findings reveal that the levels of C3 and C4 are not considerably different, and this result is consistent with previous studies (13). Findings reveal no difference in levels between patients with AA and healthy controls, and contradiction with the research of (14) that show Complement C4 and C3 were decreased in 67.4% (56/83) and in 9.6% (8/83) of patients, respectively. There were no statistically significant differences between the two groups. C3 deposits in the hyaline membrane of the hair bulb, as well as the connective tissue sheath of anagen hair follicles in both normal and AA-affected scalp, led to the hypothesis that C3 regulates the hair cycle (15) and is not acceptable with

another study of Ribeiro (14) Complement C4 and C3 levels were reduced. in 67.4% (56/83) and in 9.6% (8/83) of patients, respectively.

4.4. VITAMIN D AND AA

The current study discovered that AA patients had considerably decreased blood vitamin D levels when compared to the normal range, which is consistent with other studies.. Aksu. (16), Yilmaz (17) that revealed considerably lower levels of vitamin D in AA patients compared to the control group (17-20) Low calcium and vitamin D levels cause transitory noncicatricial alopecia, implying a role for calcium and potentially vitamin D in postnatal HF cycling Several investigations have found that patients with AA had a much greater frequency of vitamin D deficiency than the control group.. V.D has a vital role in the hair cycle and suppresses the development of dendritic cells which in turn reduces the activation of T-cells and the T-cells mediated immune response. Vitamin D also increases the production of regulatory of CD4+ CD25+ regulatory T cells and enhances their inhibitory function which plays a very important role in self-tolerance and therefore in the prevention of autoimmunity (21) (Gorman et al.2007) Hair loss in AA is caused by the destruction of HF cycle. The significance of vitamin D in HF cycling, on the other hand, is unclear .VDR may function as a selective suppressor/de-repressor of gene expression in the absence of 1,25(OH)2D3 (22) (Lee SM et al.2016) . Wnt/ β -catenin signaling is a key player in inducing the onset of anagen and maintaining the cycling transition during the initiation and regeneration of HFs (23) Reduced VDR expression in AA might be linked to diminished hair cycle-related signals. -Wnt/ β -catenin signals (24) vitamin D may affect the HF cycling through its impact on autoimmunity in AA pathogenesis .

5. CONCLUSION AND RECOMMENDATION

The role of complement was a contributor to the diagnosis of AA. And the presence of a high level of IFN in the study played a role in increasing the infection due to its effectiveness, as its presence in a large percentage works to deprive the dermal papillary cells of their ability to maintain hair growth and the presence of a percentage of it works to stimulate cytokines in the sites of inflammation. It is also possible to stimulate a cytotoxic molecule called iNOS, and due to this role and its effect on injury, this helps in the future on how these values may change among individuals suffering from the development of the disease. The presence of the role of vitamin D is an influential factor in the role of hair cycling, and its deficiency leads to hair loss. Vitamin D supplementation may play a therapeutic role in reducing disease.

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