



## EVALUATION OF IRON, FERRITIN, FOLIC ACID, ZINC AND VITAMIN B12 LEVELS IN ALOPECIA AREATA

**Dr. K Hari Krishna**

Associate Professor, Department of Dermatology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru - 534005, West Godavari District, Andhra Pradesh, India

**Dr. G Aruna\***

Associate Professor, Department of Biochemistry, Alluri Sitarama Raju Academy of Medical Sciences, Eluru - 534005, West Godavari District, Andhra Pradesh, India  
\*Corresponding Author

### ABSTRACT

**Background:** Alopecia areata is an auto immune disease in which autoantigens, T cells play an important role causing inflammation around anagen phase of hair follicles.

**Aim:** The aim of this study was to analyse Serum Iron, Ferritin, Folic acid, Zinc and Vitamin B 12 levels in patients with Alopecia areata and to find their role in Alopecia areata.

**Materials and Methods:** The study was done in ASRAM Medical College and Hospital. The study includes 80 patients with clinically and trichoscopically diagnosed AA cases, and 160 healthy age- and sex-matched controls. Levels of Serum Iron, Zinc, Folic acid, Ferritin, vitamin B12, Haemoglobin, MCV and SIB were recorded in both groups.

**Results :** Serum Iron, Ferritin, Folic acid and Zinc deficiency is more common in Alopecia areata. There was no significant difference in Vitamin B 12 between patients and controls.

**Conclusions:** It is recommended that Serum Iron, Zinc, Folic acid and Ferritin deficiency should be screened in Alopecia areata cases .

**KEYWORDS :** Alopecia areata(AA), Iron(SI), Zinc, Serum iron binding globulin(SIB), vitamin B12, Folate., Mean corpuscular volume (MCV)

### Introduction

Alopecia areata (AA) is a common form of nonscarring alopecia characterized by hair loss with no clinical signs of inflammation and can affect scalp and/or any hair-bearing area of the body.<sup>[1]</sup> It is a common dermatological disorder and accounts for 25% of all alopecia cases.<sup>[2]</sup> It can occur at any age and there is no sex predilection although some studies show male preponderance.<sup>[3]</sup> Scalp is the most common site (90%). AA is classified on the basis of extent and pattern of hair loss.<sup>[4]</sup> It can be patchy AA, alopecia totalis in which entire scalp and body hair such as eyebrows, eyelashes, beard, axillary hair, and pubic hair is affected, and alopecia universalis if the total body hair is involved. Various patterns of AA include reticular, ophiasis, and sasaipho, acute diffuse and total alopecia. The unusual variants include perinaevoid and linear forms.<sup>[5]</sup> Causes may vary from common and treatable nutritional (Iron, vitamin B<sub>12</sub>, B<sub>6</sub>) deficiency to less common zinc deficiency.<sup>[6,7]</sup> In view of these points and background we designed this study to find the association between Iron, Ferritin, vitamin B<sub>12</sub>, folate and Zinc levels in Alopecia areata.<sup>[6,7]</sup>

**Materials and Methods:** In our study, 80 patients of Alopecia areata, attending the out patient department from March to July 2016 to ASRAM Medical College and Hospital were included. The diagnosis was made on the basis of clinical features and trichoscopy. The control group consisted of 160 healthy age and sex-matched individuals with no history of Alopecia areata.

**Inclusion criteria :** All cases of Alopecia areata

### Exclusion criteria:

- (1) Patients suffering from any other systemic or dermatological disorder.
- (2) Other causes of alopecia including scarring alopecia, androgenic alopecia, telogen effluvium, and female pattern hair loss.
- (3) Patients who had received oral or topical medications during the past 4 weeks (Vitamins, Iron, Folic acid, Zinc supplements).
- (4) Pregnant and lactating females.
- (5) Malnutrition and Underweight patients.

An informed consent was obtained from all patients after explaining to them the nature of the study and the procedures. The study was approved by the ethical committee of the hospital.

History regarding the onset, progression, duration of disease, presence of any other diseases, history of drug intake, family history was noted.

In both the groups clinical and laboratory data were recorded. Laboratory tests performed included Hemoglobin, Serum Iron, SIB, MCV, Ferritin, Folic acid, zinc and vitamin B<sub>12</sub> levels . The patients were further subgrouped into 1. Single Patch 2. Multiple Patch 3. Totalis

### Statistical analysis

Statistical analysis was done using Independent sample t-test. P value < 0.05 was considered statistically significant.

### Results

**Table 1: Laboratory parameters of the patients and the controls**

		N	Mean	Std. Deviation	Minimum	Maximum	P Value
Hemoglobin 12-17.00 g/dl	Control	160.00	12.89	.76	11.60	14.20	>0.05 (N.S)
	Cases	80.00	12.77	.93	11.00	14.50	
MCV 80.00-100.00 fl	Control	160.00	83.10	2.22	80.00	89.00	>0.05 (N.S)
	Cases	80.00	82.96	.80	81.00	85.40	
SIB 220-420 µg/dl	Control	160.00	344.62	33.08	300.00	400.00	<0.001 (Sig)
	Cases	80.00	390.85	4.80	366.00	399.00	
SI 50-170 µg/dl	Control	160.00	87.51	4.83	62.00	93.00	<0.001 (Sig)
	Cases	80.00	71.35	7.92	60.00	82.00	
Ferritin M: 30-400 ng/ml F: 13-150 ng/ml	Control	160.00	58.72	4.30	33.00	63.00	<0.001 (Sig)
	Cases	80.00	47.06	10.99	31.00	61.00	
Zinc µg/dl	Control	160.00	83.64	7.52	59.00	98.00	<0.001 (Sig)
	Cases	80.00	76.29	4.44	52.00	82.00	
Folic acid 3.1-17.5 ng/ml	Control	160.00	5.18	.29	4.60	6.00	<0.001 (Sig)
	Cases	80.00	5.05	.26	4.60	5.60	
Vit B 12 197-866 pg/ml	Control	160.00	328.96	14.89	300.00	375.00	>0.05 (N.S)
	Cases	80.00	329.78	5.40	320.00	344.00	

\* INDEPENDENT SAMPLE T TEST IS USED.

\*\* N.S. = NOT SIGNIFICANT

**Table 2 Male, Female Analysis**

	Sex Recoded	N	Mean	Std. Deviation	P value
Hemoglobin 12-17.00 g/dl	Male	42.00	13.54	.47	<0.001 (Sig)
	Female	38.00	11.92	.41	
MCV 80.00-100.00 fl	Male	42.00	82.91	.88	NS
	Female	38.00	83.03	.71	
SIB 220-420 µg/dl	Male	42.00	390.43	3.93	NS
	Female	38.00	382.71	57.39	
SI 50-170 µg/dl	Male	42.00	78.43	3.07	<0.001 (Sig)
	Female	38.00	63.53	1.91	
Ferritin M: 30-400 ng/ml F: 13-150 ng/ml	Male	42.00	57.26	1.48	<0.001 (Sig)
	Female	38.00	35.79	2.62	
Zinc 70-150 µg/dl	Male	42.00	77.02	4.53	NS
	Female	38.00	75.47	4.26	
Folic acid 3.1-17.5 ng/ml	Male	42.00	5.01	.28	NS
	Female	38.00	5.09	.24	
Vit B 12 197-866 pg/ml	Male	42.00	331.67	6.23	<0.001 (Sig)
	Female	38.00	327.68	3.26	

**Table 3 : Laboratory parameters comparison depending on patches**

	Mean		Std. Deviation		P Value
	Single Patch	Multiple patch	Single Patch	Multiple patch	
Hemoglobin : 12-17.00 g/dl	12.76	12.77	.95	.92	NS
MCV : 80.00-100.00 fl	82.88	83.03	.73	.85	NS
SIB: 220-420 µg/dl	391.27	382.88	3.66	53.85	NS
SI: 50-170 µg/dl	71.43	71.28	8.23	7.74	NS
Ferritin : M: 30-400 ng/ml F: 13-150 ng/ml	47.49	46.70	10.94	11.15	NS
Zinc : 70-150 µg/dl	75.27	77.16	5.98	2.20	NS
Folic acid : 3.1-17.5 ng/ml	5.01	5.09	.22	.29	NS
Vit B 12 : 197-866 pg/ml	329.57	329.95	5.61	5.27	NS

Out of 80 individuals included in the patient group, 38 were female and 42 were male patients. On the other hand, out of 160 individuals included in the control group, 76 were female and 84 were male. According to the statistical analyses, the patients had significantly lower levels of serum Iron (SI), Ferritin, Folic acid and zinc in patients of Alopecia areata ( $P < 0.001$ ) and significantly higher levels of serum iron binding capacity (SIB) than the controls ( $P < 0.001$ ). Hemoglobin, MCV, Vitamin B 12 showed no significant change. Table 1.

## Discussion

Zinc is extremely important for maintaining homeostasis in human body and is one of the major components of hormones, signal molecules and enzymes. There are few reports suggesting no relation between zinc deficiency and hair loss.<sup>[13]</sup> In the present study, significant difference was found in serum zinc levels between the patients with Alopecia areata and the control group which should be further investigated.

There are no significant data in the literature suggesting a clear relation between nutritional factors and hair loss. Iron deficiency is one of the most common nutritional deficiencies that a dermatologist can come across in daily practice.<sup>[8]</sup>

In the present study, significant difference was found in serum Iron and Ferritin levels between the patients with Alopecia areata and the control group. It is not known how reduced iron stores affect hair loss. But iron is a known cofactor in ribonucleotide reductase, a rate-limiting enzyme for DNA synthesis. Hair follicle matrix cells are among the most rapidly dividing cells in the body. They may be very sensitive even to a small reduction in iron availability, hence resulting in reduced hair growth in the presence of iron deficiency<sup>[9]</sup>. However, there is no sufficient evidence currently to recommend a routine

screening for iron deficiency in patients with hair loss and replacement of iron.<sup>[10,11,12]</sup> For example, Sinclair et al.<sup>[11]</sup>

Gonul et al.<sup>[14]</sup> found that Serum Ferritin, Iron, vitamin B12 and Folate levels of the patients with alopecia areata were no different from those of the controls.

Durusoy et al.<sup>[15]</sup> investigated the role of serum Iron, Zinc, Folate and vitamin B12 levels and the role of psychological factors in the aetiology of trichodynia in a case-control study and found no relation. In the present study also no significant difference was found between the patients and the controls in vitamin B12 levels.

There was significant decrease in Folic acid in cases. Folic acid is essential for the synthesis, repair and use of DNA. Folic acid is crucial for rapid cell division which is essential for human growth. Without Folic acid, RBC lose their forms and cannot carry their full capacity of oxygen. This leads to anaemia.

There was significant decrease in Hb, SI, Ferritin, B 12 in females when compared to males. Ferritin is the storage form of Iron. There was no difference in Zinc, SIB, MCV and Folic acid levels in females when compared to males. Table 2.

There was no significant decrease in Hb, SI, Ferritin, Folic acid, B 12 levels between single patch and multiple patch (including Alopecia areata patients). Table 3.

We think that Serum Iron, Zinc, Folate, Ferritin deficiency should be screened in patients of Alopecia areata patients.

In female Alopecia patients B 12 should also be screened. All Alopecia areata patients should be given supplements of Iron, folate, zinc and female Alopecia areata patients should be given additional B 12 after thorough screening.

To the best of our knowledge, although there are few studies in the literature which are similar to our study, We think that the role of serum iron (SI), zinc, Folic acid, Ferritin in patients of Alopecia areata should be further investigated.

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