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Original Research Article

Correlation between serum ferritin and severity of alopecia areata

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ABSTRACT

Introduction: Alopecia areata is a common cause of patchy hair loss. It is an autoimmune disorder with unpredictable course. Total body iron store is an integral factor in the development of hair follicle. Numerous studies have been done to find the relationship between serum ferritin and alopecia areata with contradictory findings.

Materials and Methods: A cross-sectional study was carried out in Dermatology Outpatient Department in a tertiary care hospital. All new cases of alopecia areata, aged 1 to 60 years were included. A detailed history was taken and clinical examination conducted. Serum Ferritin of all patients was measured. Clinical severity of alopecia areata was assessed and compared with the ferritin levels. Analysis of data was done by SPSS software, version 16.0.

Results: A total of 36 patients including 23 males and 13 females were studied. Mild AA was seen in 11 patients including 6 males and 5 females. Moderate AA was seen in 25 patients including 17 males and 8 females. The mean serum ferritin in males with mild AA was 179.4 ng /ml and those with moderate AA was 125 ng /ml. In females, mean serum ferritin in mild AA was 64.27 ng /ml and in moderate AA it was 46.46 ng/ml.

Conclusion: Our study showed that with increase in severity of AA, there was a decrease in mean serum ferritin both in males and females. This implies that the severity of AA is influenced by serum ferritin levels. Since our study did not include controls, no postulates can be made in this regard. Further studies with larger number of subjects are essential to know the exact role of ferritin in alopecia areata and its severity.

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1. Introduction

Alopecia areata (AA) is a common cause of non cicatricial alopecia, characterised by single or multiple patches of hair loss. It usually involves the scalp, but can involve any part of the body including eyebrows, eyelashes. It is an autoimmune condition wherein T-cells attack the hair follicles. It has an estimated lifetime incidence of 2.1% with no difference in incidence between genders.[1] It is believed to have a polygenic inheritance and the HLA gene association are as follows- HLA-DQB1, HLA-DRB1, HLA-A, HLA-B, HLA-C.[2] It is frequently associated with autoimmune diseases like thyroid disease, pernicious anemia, diabetes mellitus, vitiligo, and psoriasis. One probable mechanism is oxidative stress, characterised by an increase in free radical production exceeding the intracellular antioxidant defence. Some studies suggest lipid peroxidation and antioxidant enzymes might be related to the pathogenesis of AA. Iron is involved in antioxidative system and large amount of iron is sequestered in the form of ferritin. The expression of ferritin is regulated by levels of iron, cytokines, hormones and oxidative stress. Ferritin has also been shown to have differential immunological activities such as suppression of antibody production by lymphocytes and suppression of delayed type hypersensitivity. Ferritin levels are increased in infections,

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inflammation and malignancies. Recently ferritin has been accepted as a novel marker for autoimmunity and elevated levels of ferritin in autoimmune disorders have been reported. Many studies have been conducted regarding iron and ferritin levels in patients with AA. Increased incidence of iron deficiency anemia has been documented in female patients.[3] We conducted this study with an aim to find the relationship between serum ferritin levels and severity of alopecia areata.

2. Materials and Methods

A cross-sectional study was carried out over a period of one year in the Outpatient Department of Dermatology, Venereology and Leprology, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur. All new clinically diagnosed cases of alopecia areata, both males and females aged between 1 and 60 years who were willing to participate in the study were enrolled. Patients with other causes of hair loss such as androgenetic alopecia, telogen effluvium, tinea capitis, cicatrical alopecia were excluded from the study. Patients with recurrent AA and those already on treatment for AA were excluded. A written**,** informed consent was taken from the patients who participated in the study. If the patient was a minor, an informed consent was taken from the parents. A detailed history was taken including onset, duration, progression of the alopecia patches. History of stressful events 1 year prior to onset such as febrile illnesses, infections, major or minor surgeries, physical trauma or stress, previous and ongoing medications were taken. Personal history and family history of atopy (including history of bronchial asthma, allergic rhinitis, atopic dermatitis) were taken and a thorough local examination and systemic examination was carried out. The number of alopecic patches, at the time of presentation were counted and size of each patch was noted. Patients were classified based on severity taking into account the size and number of lesions.

The severity of disease was defined as follows:[4]

1. Mild: three or less patches of alopecia with a widest diameter of 3 cm or less or the disease limited to the eyelashes or eyebrows.
2. Moderate: existence of more than 3 patches of alopecia or a patch greater than 3 cm at the widest diameter without alopecia totalis (AT) or alopecia universalis (AU).
3. Severe: Alopecia totalis, alopecia universalis.
4. Ophiasis: snake-shaped plaques extending to the scalp border or loss of hair in the shape of a wave at the circumference of the head.

Serum ferritin was measured in all cases. Other investigations included complete haemogram and thyroid profile. ANA and anti ds-DNA was done whenever indicated. Serum ferritin was done by electrochemiluminescent immunoassay method. Normal values of serum ferritin are as follows: a) Males = 30 – 400 ng /ml, b) Cyclic females = 13 – 150 ng/ml, c) Menopausal females = 24.4 – 278 ng/ml. Mean serum ferritin was calculated for males and females. Data so collected was checked for completeness. Summarization and analysis was carried out using descriptive statistics and Chi-Square test. Analysis of the data was done by SPSS software, version 16.0. Descriptive statistics (mean, percentages and frequency distribution) were used to evaluate the results.

3. Results

A total of 36 patients were studied which included 23 males and 13 females. Out of these mild AA was seen in 6 males and 5 females, moderate AA was found in 17 males and 8 females. We did not get any cases of alopecia totalis (AT), alopecia universalis (AU) or ophiasis (Table 1).

Serum ferritis was low in 2 males and 1 female. It was high in one male patient. None of the female patients had high serum ferritin levels. Rest of the patients had normal ferritin levels (20 males and 12 females) as in. Table 2

Mean ferritin value in males with AA was 123ng/ml with a SD of 115.19. The mean ferritin value in females with AA was 59.94ng/ml with a SD of 45.38 (Table 2)

Mean ferritin levels in males with mild AA is 179.4 ng/ml with a SD of 187.9. Mean ferritin levels in males with moderate AA was 125.0 ng/ml and its SD was 108.53 (Table 4). Thus the mean ferritin value in males is lower in moderate AA in comparison to mild AA. But this result was not statistically significant (p value = 0.61). Mean ferritin levels in females with mild AA was 64.27ng/ml with SD of 49.63. Mean ferritin levels in females with moderate AA was 46.46ng/ml with a SD of 40.10 (Table 5) Thus, females with moderate AA had a lower mean ferritin value as compared to that in mild AA. However this finding was not statistically significant (p value = 0.573).

4. Discussion

In our study we found that in most of the patients, the serum ferritin level was within normal limits. However there was wide variation in the individual values of serum ferritin in both male and female AA patients. Hence we decided to take into consideration the mean serum ferritin value. The mean serum ferritin was lower in females compared to males. Our finding is similar to that of Gonul M et al who also reported lower mean ferritin levels in females.[3] This is because the normal range of serum ferritin is lower in females than in males, which is secondary to menstrual blood loss in females, thus reducin g their iron stores. Further the mean serum ferritin was correlated with the severity of AA. We found that the mean ferritin value was lower in male patients with moderate AA in comparison to mild AA. However this result was

Table 1: Classification of patients based on severity of alopecia areata

Sex	Mild AA	Moderate AA	Severe AA (AT, AU)	Ophiasis	Total
Males	6	17	0	0	23
Females	5	8	0	0	13

Table 2: Serum ferritin levels in AA patients

Sex	Serum ferritin			Total N (%)
	Low N (%)	Normal N (%)	HighN (%)	
Male	2 (8.6)	20 (86.9)	1 (4.3)	23 (100)
Female	1 (7.69)	12 (92.3)	0 (0)	13 (100)

Table 3: Mean serum ferritin

Sex	Mean serum ferritin (ng/ml)	Standard deviation
Males	123	115.19
Females	59.94	45.38

Table 4: Association between mean ferritin values with severity of AA in males

Severity of AA in males	Number of males	Mean ferritin (ng/ml) in males	Standard deviation (SD)	P value
Mild AA	6	179.4	187.9	0.61
Moderate AA	17	125.0	108.53	

Table 5: Association between mean ferritin levels with severity of AA in females

Severity of AA in females	Number of females	Mean ferritin (ng/ml) in females	Standard deviation (SD)	P value
Mild AA	5	64.27	49.63	0.573
Moderate AA	8	46.46	40.10	

not statistically significant (p value = 0.613). Among females too, patients with moderate AA had a lower mean ferritin value as compared to those with mild AA. However this finding was also not statistically significant (p value = 0.573). We could not measure mean serum ferritin of patients with severe AA ie alopecia totalis (AT) and alopecia universalis (AU) as we did not get any cases. In short, our study found that the mean ferritin values in both males and females were lower in patients with moderate AA than in patients with mild AA. This suggests that severity of AA increases with decrease in serum ferritin. Chisti MA et al also found that mean serum ferritin value of AA cases was significantly lower than that of the controls.[5] Kantor J et al found that the mean ferritin levels in patients with alopecia areata were statistically significantly lower than the ferritin levels in women without hair loss. But the ferritin levels in patients with alopecia areata universalis or totalis were not significantly lower than in normal controls.[6] However, Wani AA et al found that serum ferritin levels were not related to extent or duration of the disease, family history, history of atopy, and nail involvement.[7]

Our study found that the mean ferritin levels reduced in both males and females with increase in the severity of AA. Although not statistically significant, we found a definite reduction in the mean serum ferritin levels in moderate AA compared to mild AA. As serum ferritin reflect the body iron stores, our findings probably suggest that a low body iron level plays a role in influencing its severity. It also suggests that decreased iron stores lowers the threshold of genetically predisposed individuals to develop AA.

5. Conclusion

The mean ferritin levels were lower in moderate AA than in mild AA in both males and females, thus implying that the severity of AA is influenced by serum ferritin levels. Further studies with larger number of subjects and controls are essential to know the exact role of ferritin in alopecia areata.

6. Source of Funding

None.

7. Conflict of Interest

None.

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