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Research Article

Study of serum zinc, copper and ferritin levels in alopecia patients

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Abstract

Alopecia or hair loss or balding is major health issue of psychological concern for females as well as males in all over world.This study included 50 diagnosed subjects of alopecia and 50 controls having age group- 18 to 40 years. In the present study serum zinc level was significantly decreased ($p<0.01$) in both females and males, whereas serum ferritin and copper levels also showed significant fall ($p<0.01$) in both females and males as compared to controls.On the basis of this findings we concluded that zinc and copperlevels as well as ferritin level also altered in alopecia.

Keywords: Alopecia, Zinc, Copper, Ferritin.

Introduction

Alopecia is defined the absence of hair from a normally hairy area, and more than 25% of women in developed countries are affected by alopecia (Van Neste DJ et al, 1997). With regard to hair loss, hair also needs adequate nutrition for its proper growth and development, and also affected in various nutritional deficiencies if occurs in body (Bradfield RB et al, 1969). Various micronutrients have also been studied as etiological factors of hair loss (Hard S, 1963 and Rushton DH et al, 2002).

Hair follicles cyclic activity and inactivity comprises of three phases. In a normal scalp, 86 % of the hairs are in anagen phase while 1 % (catagen) and 13 % (telogen) phase at any given point of time. The normal human scalp has about 100,000. Approximately 100 hairs are shed everyday (Barman JM et al, 1965).

Zinc has significant role in the body and is convoluted in the action of more than 200 enzymes.**(**Knight J. A Ed, 2009**)**.Zinc is a potent inhibitor of hair loss. It inhibits hair follicle regression, and enhance the hair follicle recovery (Plonka PM et al, 2005). Some studies have shown that zinc deficiency has correlations with alopecia areata (AA) and telogen effluvium (Arnaud J et al, 1995). Copper is required for the formation of haemoglobin and it is also responsible to carry oxygen in red blood cells. Haemoglobin is essential for the maintenance of an adequate supply of blood to the hair shaft. A shortage of copper can deteriorate the hair shaft and cause enlarged hair shedding (Bode P et.al. 2000). Additionally, a few studies have been conducted on the role of copper in hair loss. Most studies have reported that a decreased concentration of copper was not observed in alopecia (Lee SY 1997).

Hair follicles are recognised to contain ferritin, and when the mingling stores of ferritin decline then these stores are called upon to confirmcare for more indispensablecells, such as bone marrow. Alteration of this ferritin from the follicle cells can disturb the ability of the hair to grow. This leads to the expansion of vellus (non- pigmented fine hairs) which can be an early sign of deficiency (Sinclair R et.al.2002). In the present study, we decided to investigate the relationship between alteration of zinc, copper and ferritin levels with alopecia.

Materials and Methods

This study was carried out in Gandhi Medical College, Bhopal and associated Hamidia Hospital. Fifty patients clinically diagnosed as alopecic, fulfilling inclusion criteria were enrolled for the study. Also fifty age &sex matched subjects without hair loss were taken as controls.

Inclusion Criteria

Female hair loss cases. Male hair loss cases

Exclusion Criteria

Subjects on chemotherapy, androgenic alopecia, alopecia areata, cicatricial alopecia and having any endocrinal disorders were excluded.

Fasting blood samples were collected and serum was separated immediately to analyse serum zinc, copper and ferritin levels. Zinc was estimated by colorimetric method. Copper was estimated manually by using sodium diethyldithiocarbamate method and Ferritin was determined by ELISA method.

Statistics analysis: All the values were expressed as Mean±SD and statistical data was analysed by Student t- test by using SPSS 20. P value <0.05 was considered as significance level. .

Results and Discussion

Table 1.Value of zinc, copper and ferritin level in female controls and alopecia patients

Parameters	Controls	Alopecia patients	p- value
Zinc (µg/dL)	167.35.88±10.82	131.67±31.06	p<0.01
Copper (mg/dL)	105.6±11.9	89.3±14.27	p<0.01
Ferritin (ng/dL)	47.59±8.2	16.7±3.5	p <0.01

Table 2. Value of zinc, copper and ferritin level in male controls and alopecia patients

Parameters	Controls	Alopecia patients	p- value
Zinc (µg/dL)	186.88±12.79	145.28±32.06	p<0.01
Copper (mg/dL)	102.5±9.56	85.3±8.9	p<0.01
Ferritin (ng/dL)	48.76±8.6	19.46±5.2	p <0.01

In this study we have taken fifty patients of alopecia to assess the serum zinc, ferritin and copper levels and for comparison, fifty normal controls were included. In the present study out of 50 patients of alopecia enrolled for the study, majority of the cases detected were female with 54% (n=27) as compared to male alopecia patients with 46% (n=23). Mean value of serum zinc in controls were 167.35.88±10.82 µg/dL and 186.88±12.79 µg/dL for females and males respectively, while in alopecia females and males its mean value were 131.67±31.06 µg/dL and 145.28±32.06 µg/dL respectively as compare to controls. The mean value of serum zinc has shown a remarkable decline in both males and females patients. Several studies also reported that the value of serum zinc declined in the alopecia patients(Tasaki et al 1993,Biyukavir M et.al, 2005).In addition to some studies have found that the serum zinc was remarkable declined in male patients as compared to female patients (Lee SY et.al. 1997). The cause of decline in serum zinc is unknown.

Serum copper was observed in control females and males in the range of 105.60±48.72 µg/dLand102.50±22.92 µg/dL respectively while in females and males alopecia patients its range was 89.30±22.48 µg/dL and 85.30±62.07 µg/dL respectively. On comparing with controls it was evidently found that the serum copper decreases more in females than in male cases. In support to our result several studies reported that the value of
serum copper lowered in the patients of alopecia and also found that the value increased more in female as compared to male patients (Tasaki et al 1993, Cousins RJ et al. 1985). In our study serum ferritin was in the range of 47.59±29.07ng/dL and 48.76±23.80ng/dL respectively in males and females control, whereas their ranges in females and males alopecia patients were 16.7±2.94 ng/dL and 19.46±6.74 ng/dL respectively. On comparing with controls, serum ferritin was more significant decrease in females than in males**.** Similar observation were found in various studies and reported the decreased value of serum ferritin in alopecia patients and the value was more reduced in females as compared to male cases **(**Rushton et al, 1990 and Van Neste, and Rushton et al, 1997). In conclusion, our results have shown an alteration of zinc, copper and ferritin levels in alopecia patients. The reason behind the imbalance of zinc, copper and ferritin levels in alopecia and how its levels affect hair loss is not clear. The future studies needs to explore the exact mechanism and role of zinc, copper and ferritin in alopecia or hair loss.

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