

METAL IONS

THE INVESTIGATIONS OF THE HAIR, SERUM FE AND FERRITIN CONCENTRATIONS IN WOMEN SUFFERING FROM ANDROGENETIC ALOPECIA

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SUMMARY: The simultaneous determinations of hair, serum Fe and ferritin concentrations in 34 19–51 years old women, suffering from androgenetic alopecia, were provided. The hair Fe by ICP-AES, serum Fe and ferritin by routine biochemical analyses were measured. We've found that 38% of all patients had the decreased hair Fe in 50% and 75% of cases, respectively; there were lowered serum ferritin and Fe concentrations revealed. Also, decreased hair Fe is in good corresponding with low serum Fe (66% of cases) but not ferritin (33%). In the cases of "Normal" hair Fe data (12–50 mg/kg) we detected the low serum Fe ferritin and only in 15.4 and 23% of patients. The statistical analysis revealed the positive correlation ($r=0.63$) between the hair and serum Fe.

So, the obtained analytical data demonstrated the essentiality of Fe metabolism disturbances diagnostics and correction in androgenetic alopecia female patients. Also, we concluded, that the Fe analysis is a relatively good tool for the evaluation of Fe status in humans.

Introduction

The term "androgenetic alopecia" was first introduced by Norman Orentreich в in the year 1988. It means a disease, related to genetically determined disturbance of androgens metabolism in skin of human scalp. In men the disease is manifested in presence of alopecia loci in frontal and parietal zones of scalp, in women – in rarefication of hair in the same zones. It is assumed that pathogenesis of this disease is well-known: in women the key points of it are hyperandrogenemia due to thyroid gland dysfunction; hyperplasia of adrenal cortex; polycystosis of ovaries; hyperprolactinemia; local disturbances of androgens metabolism; increased sensitivity of androgen-sensitive receptors in the area of external and internal root sheathes of hair follicles, hair papillae and sebaceous glands. In hair follicles dihydrotestosterone is formed from free fraction of testosterone through the agency of 5- α -reductase type 1. The dihydrotestosterone have a direct influence on a hair follicle, causing multiple morpho-functional changes in it, that leads to reduction of anagenic phase length, decrease of hair follicle diameter, reduction of hair growth speed, decrease of hair thickness (Hay, Hodgins, 1978).

Women are found to have six-fold more cytochrome P-450 aromatase, an enzyme-antagonist of 5- α -reductase. The aromatase facilitates conversion of androgens, synthesized in adrenal glands (in the first place androsterone and testosterone), to estrone and oestradiol. Ferroporphyrinic prosthetic groups (haems) are subunits of this enzyme (Schweikert et al., 1974).

Clinical investigations of women, suffering from androgenetic alopecia, show increased level of free testosterone and dihydrotestosterone in blood serum in 40% cases.

There are very few literature data mentioning participation of iron-deficient states in pathogenesis of the considered type of alopecia (Petrov, 1982; Kozlovskaya, 1996).

We have interested in such fact that latent hyposiderosis is detected in the majority of women with diagnosed androgenetic alopecia. Moreover, successful correction of the hyposiderosis has a distinct positive influence on the course of disease.

It is well-known that complex of permanent symptoms of iron-deficient states includes decrease of hair thickness, reduction of hair growth speed, hair loss, marked rarefication of hair. The mentioned symptoms are claimed to be connected with impairment of oxidation-reduction processes in tissues. No doubt that insufficient activity of the aromatase play an important role in pathogenesis of the androgenetic alopecia, while a probable reason of its low activity can be iron deficiency due to above-mentioned haemal nature of this enzyme.

Both total iron content in diet and its assimilation predominantly depend on proportion of plant- and animal-originated products in food ration. Iron requirements are determined by its endogenous spending connected to pregnancy, growth, blood loss of different origin, as well as desquamation of skin and intestinal epithelium. The main reason of iron deficiency in child-bearing age women is regular menstrual blood losses. The calculations show that monthly blood losses, exceeding 60 mg of iron, can not be compensated by food products only and inevitably lead to iron-deficient state.

Materials and Methods

We carried out simultaneous determination of iron concentration in hair and blood serum, and serum fer-

ritin concentration in women suffering from androgenetic alopecia.

The determination of serum ferritin and iron concentration was made by routine biochemical methods; the determination of hair iron content was made by atomic emission spectrometry with inductively coupled argon plasma (ICP-AES) method using PerkinElmer (USA) Optima 2000 DV spectrometer.

Results and Discussion

The investigation shows that 38% of patients have decreased content of iron in hair while in 50% and 75% cases respectively the serum iron and ferritin concentration was decreased too.

In addition, it is appeared that low hair iron level reflects deficiency of this element in blood serum well enough (66%), but not ferritin deficiency (33%). At the same time, normal hair iron content correlate with low serum iron in 15,4%, and with low serum ferritin in 23% of patients. Thus, statistical analysis shows positive correlation between iron content in hair and its concentration in blood serum.

In the course of iron deficiency correction, in our patients a distinct positive effect, manifested in decrease of hair loss, increase of hair thickness, rigidity and pigmentation, developed by the end of third month of the treatment or in the beginning of the fourth one, especial-

ly in cases, when the ferritin concentration rise 50 ng/ml.

We recommend to include administration of group B vitamins, cytochrome C and intravenous injections of ozone-oxygen mixture into the complex treatment in addition to iron preparations.

Conclusions

1. Iron metabolism disturbances investigation are essential for diagnostics and correction of androgenetic alopecia in female patients
2. Analysis of iron level in hair is a relatively good tool for the evaluation of iron status in humans

References

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