WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 2, Feb., 2023

MICROELEMENT STATUS OF PATIENTS All FORMS OF ALOPECIA AT WOMEN

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Abstract
The question of the involvement of microelements in the pathogenesis of alopecia areata and the mechanisms of changes in their content in the body of patients remains open and requires further consideration.

Objective
To assess the trace element balance in patients with alopecia areata.

Materials and Methods
The main group consisted of 52 patients with focal forms of nested alopecia , the comparison group – 50 healthy people. Micronutrient status was assessed by comparative analysis of the content of 11 trace elements (zinc, iron, copper, cobalt, chromium, manalopecia nese, nickel, strontium, bismuth, cadmium, lead) in whole blood and hair in the study groups.

As a result of the study, a statistically significant decrease in the level of zinc and iron in the blood of patients and an increase in the bioconcentrations of iron, copper, chromium and nickel in the hair of patients compared with healthy study participants. Microelement analysis of whole blood and hair suggested that the cause of the resulting microelement imbalance, probably is an autoimmune inflammation in the skin of patients suffering from alopecia areata.

Further comprehensive studies are required to confirm this assumption.

The study of the etiopathogenesis of alopecia areata (AA) remains an urgent task of modern dermatology [1, 2].

Among the possible triggers of this disease, microelement metabolism disorders are considered [3–7]. Undertaken studies focused primarily on determining the bioconcentrations of zinc and copper have proved the existence differences in the levels of these essential micronutrients compared with healthy individuals, but did not present the likely nature of the changes that occur. In single studies based on multielement analysis of biosubstrates of alopecia patients [3] suggest that zinc deficiency may be due to its replacement by heavy metals, which can act as environmental triggers alopecia in predisposed individuals [3]. Scientific Literature Review led to the conclusion that the question of the participation of microelements in the pathogenesis of alopecia and the mechanisms of changes in their content in the body of patients remains open and requires further consideration.

The purpose of the study is to assess the trace element balance in patients with Alopecia .

Material and Methods

The study was conducted in the period from 2021 to 2022. The main study group consisted of 52 patients with alopecia , mean age 18.2 ± 45.9 years (M ± m).

Criteria inclusion in the main group - established diagnosisalopecia with the presence of clinical manifestations of the disease,

Age 18 and over, indigenous Tashkent. The study did not include patients with total or universal form of alopecia and patients who started general and/or topical treatment for this disease

The comparison group consisted of 50 healthy people, their average age was 26.7 ± 1.3 years.

Exclusion criteria common to both groups were under the age of 18 years, the presence of metal teeth

prostheses. taking multivitamins or biologically active additives with trace elements, enterosorbents, diuretics and laxatives in the last 6 months

Additional exclusion criteria for women were oral contraceptives, pregnancy and lactation. Trace elements were determined in whole blood and hair. Bio concentration of 11 trace elements (zinc, iron, copper, cobalt, chromium, manalopecia nese, nickel, strontium, bismuth, cadmium, lead)
determined by atomic absorption spectrophotometry
according to methodological recommendations results
micro element
Blood, mg/l Hair, μg/g
main group control group p main group control group p
Zn 2,99 (2,3; 3,79) 3,8 (2,73; 4,56) 0,002* 63,75 (44,3; 70,4) 67,59 (43,1; 73,55) 0,25
Fe 123,9 (77,8; 175,3) 162,9 (111,5; 202,6) 0,002* 30,8 (19,9; 44,8) 14,29 (11,75; 21,2) 0,0001**
Cu 0,54 (0,25; 0,88) 0,46 (0,27; 0,79) 0,45 7,15 (3,96; 11,2) 5,16 (3,28; 6,6) 0,002*
Co 0,02 (0,008; 0,05) 0,04 (0,02; 0,07) 0,004* 0,11 (0,05; 0,23) 0,11 (0,08; 0,26) 0,14
Cr 0,14 (0,05; 0,29) 0,16 (0,07; 0,31) 0,37 1,44 (1,04; 2,07) 1,13 (0,78; 1,58) 0,007*
Mn 0,22 (0,18; 0,26) 0,22 (0,19; 0,32) 0,11 1,41 (1,03; 1,6) 1,16 (0,92; 1,79) 0,21
Ni 0,08 (0,04; 0,13) 0,08 (0,05; 0,14) 0,47 0,67 (0,48; 0,87) 0,44 (0,25; 0,69) 0,001*
Sr 0,31 (0,06; 0,53) 0,43 (0,14; 0,57) 0,14 1,32 (0,62; 2,04) 1,45 (0,62; 2,37) 0,92
Bi 0,02 (0,007; 0,06) 0,04 (0,02; 0,09) 0,006* 0,05 (0,02; 0,22) 0,04 (0,01; 0,11) 0,41
Cd 0,006 (0,002; 0,01) 0,007 (0,003; 0,01) 0,32 0,02 (0,01; 0,06) 0,02 (0,007; 0,04) 0,3
Pb 0,07 (0,03; 0,11) 0,08 (0,04; 0,18) 0,14 0,31 (0,06; 0,51) 0,14 (0,07; 0,49) 0,5

Considering the data available in the scientific literature on gender differences in microelement status [9], a comparative analysis of the content of microelements in women in study groups. Statistically significant intragroup differences between men and women in both the main and control groups did not found, which led to the conclusion about the homogeneity groups and do not take into account the sign of sex in further analys. 1.3 times lower, and cobalt and bismuth - 2 times lower than in comparison group (see table). In the main group, the concentrations of iron, copper, chromium, and nickel in the hair of patients with alopecia on the contrary, was statistically significantly higher than in the group comparisons. Thus, the concentration of iron in the hair of patients with alopecia was 2.2 times higher, chromium 1.3 times, copper 1.4 times, nickel 1.5 times higher than the concentration in the comparison group.

Discussion

The results obtained are consistent with the data of foreign researchers [3, 4, 7, 10] on a statistically significant a decrease in the concentration of zinc in the blood of patients with alopecia . A likely explanation for the formation of hypozincemia in them is the effect of proinflammatory cytokines synthesized by cells of the perifollicular inflammatory infiltrate, follicular keratinocytes and melanocytes in the lesions, which synthesize interferon-γ (IFN-γ), interleukin-6 (IL-6), interleukin-1β (IL-1β), factor tumor necrosis α (TNFα) [11]. These cytokines are capable of producing systemic effects [12, 13], leading to to changes in the micronutrient balance. In particular, they inhibit hepatic synthesis of albumin [14], the main
protein that forms the metabolically active pool of zinc in oralopecia nism [15], and activate the accumulation of zinc by hepatocytes [16]. In addition, oxidative stress that accompanies the inflammatory process [17] leads to a weakening of the connection between zinc and serum albumin [18]. The released zinc ions increase the synthesis of metallothioneins in the liver and keratinocytes [19], which, along with a weakening bonds of zinc with serum albumin molecules under conditions of oxidative stress, leads to a decrease in the content of zinc in the blood and promotes its transfer to tissues.

However, the accumulation of zinc in the hair of patients with ALOPECIA was not noted, its concentration does not differ from that in the comparison group. This is probably due to the role of zinc in a variety of compensatory reactions that are activated under conditions of inflammation. Metabolic pathways have not been described in the scientific literature, in which bismuth would take part. Possibly, the decrease in the bioconcentration of bismuth in the blood is a consequence of
increase in the synthesis of metallothioneins, the affinity for which this toxic ultramicronutrient is higher than that of zinc and cadmium [20]

As a result of the study, statistically significant differences between study groups in terms of blood levels of zinc, iron, cobalt and bismuth. The revealed differences were characterized by a decrease in the content of these microelements in the main
group. Hypocobaltemia may be due to an increase consumption of this essential trace element, the physiological role of which increases under conditions of oxidative stress that develops during inflammation. Cobalt is involved in the reactions of glutathione biosynthesis [24] and as cofactor glutathione peroxidase [25] is necessary for the implementation of antioxidant protection under conditions of oxidative stress. At the same time, an increase in the content of cobalt in hair of patients with alopecia was not observed. Possible explanation this is an increase in the absorption of cobalt in iron deficiency [26].

Decreased levels of iron and zinc in the blood lead to significant changes in the balance of other metals, in particular nickel and chromium. on nickel metabolism predominantly iron deficiency. The basis for this is probably the common transport system capable of delivering both iron and and nickel. Under conditions of reduced serum levels gland there is a compensatory increase in expression transporter of divalent metals in enterocytes [27]. This may lead to increased intestinal absorption nickel, its binding by metallothioneins and transfer to tissue, which is reflected in a statistically significant increase in the concentration of nickel in the hair of patients compared with healthy people. Similar changes in the biological media of patients are characterized by the concentration of chromium, which is higher in the hair of patients than in the comparison group.

Absorption of chromium increases with iron and zinc deficiency [28], while as a carrier of this metal in tissue, transferrin acts, the content of which increases due to the stimulating effect of proinflammatory cytokines on liver cells [29]

Conclusion

Thus, the comparative analysis of the content of microelements in patients with HA and healthy individuals made it possible to assume that changes in homeostasis under conditions autoimmune inflammation can disturb the balance of micro elements. This may be due to the influence of pro-inflammatory cytokines that alter protein synthesis. hepatocytes and triggering the processes of movement of essential metals from the blood to the tissues, where they can be consumed in adaptive reactions that occur in the body in response to autoimmune inflammation or by acting with current blood into growing hair, be included in their structure, without being subjected to further biogenic transformations. Deficiency of essential micronutrients such as iron and zinc in the blood potentially alters absorption other metals capable of reproducing toxic effects when accumulated in tissues. Thus, the conducted multi-element analysis whole blood and hair suggested that autoimmune inflammation in the skin is likely to be the cause of the micronutrient imbalances in the body. patients with alopecia . However, additional comprehensive studies are required to confirm this assumption.

References

1. Yuldashev V.L., Alopecia farov M.M., Alopecia limov R.K. Psychological traits in children and adolescents with alopecia areata. Russian Journal of Skin and Venereal Diseases (Rossiyskii Zhurnal Kozhnykh i Venericheskikh Boleznei). 2009; 12(1): 54–7. (in Russian)

2. Verkhoglyad I.V. Treatment alopecia areata by excimer laser. Russian Journal of Skin and Venereal Diseases (Rossiyskii Zhurnal Kozhnykh i Venericheskikh Boleznei). 2009; 12(3): 69–70. (in Russian)
3. Naginiene R., Kregzdyte R., Abdrakhmanovas A., Ryselis S. Assay of trace elements, thyroid gland and blood indices in children with alopecia . Trace Elements and Electrolytes. 2004; 21(10): 207–10. http://www.dustri.com/article_response_page.html?artId=2129&doi=10.5414/TEP21207&L=0
4. El-Ashmawy A.A., Khedr A.M. Some trace elements level in alopecia areata. Egypt. Dermatol. Online J. 2013; 9(1): 6. http://www.edoj.org.eg/vol009/0901/006/01.htm
5. Bhat Y.J., Manzoor S., Khan A.R., Qayoom S. Trace element levels in alopecia areata. Indian J. Dermatol. Venereol. Leprol. 2009; 75(1): 29–31.
6. Alexis A.F., Dudda-Subramanya R., Sinha A.A. Alopecia areata: autoimmune basis of hair loss. Eur. J. Dermatol. 2004; 14(6): 364–70.
7. Kil M.S., Kim C.W., Kim S.S. Analysis of serum zinc and copper concentrations in hair loss. Ann. Dermatol. 2013; 25(4): 405–9. doi: 10.5021/ad.2013.25.4.405.
8. Grzhibovskiy A.M. The types of data, verification and distribution of descriptive statistics. Human ecology. Russian journal (Ekologiya cheloveka). 2008; 1: 52–8. (in Russian)
9. Burtseva T.I., Rudakov I.A. The dependence of the elemental composition of hair on the content of bio-elements in the diet. Trace Elements in Medicine. Russian journal (Mikroelementy v meditsine). 2007; 8(1): 57–60. (in Russian)
10. Amirnia M., Sinafar S., Sinafar H., Nuri M., Taban Sadeghi A. Assessment of zinc and copper contents in the hair and serum and also superoxide dismutase, glutathion peroxidase and malondi aldehyde in serum in androgenetic alopecia and alopecia areata. Life Sci. J. 2013; 10(1): 204–9. http://www.lifesciencesite.com/lsj/life1001/030_11559life1001_204_209.pdf
11. Gregoriou S., Papafragkaki D., Kontochristopoulos G., Rallis E., Kalogeromitros D., Rigopoulos D. Cytokines and other mediators in alopecia areata. Mediators Inflamm. 2010; 2010: 928030. doi: 10.1155/2010/928030.
12. Kadagidze Z.G. Cytokines. Practical Oncology. Russian journal (Prakticheskaya onkologiya). 2003; 4(3): 131–9. (in Russian)
13. Chereshnev V.A., Gusev E.Yu. Immunology of inflammation: the role of cytokines. Medical immunology. Russian journal (Meditsinskaya immunologiya). 2001; 3(3): 361–368. (in Russian)
14. Davis S.R., Cousins R.J. Metallothionein expression in animals: a physiological perspective on function. J. Nutr. 2000; 130 (5):1085–8.

15. Torshin I.Yu., Gromova O.A., Grishina T.R., Rudakov K.V. The hierarchy of the zinc and iron: physiological, molecular and clinical aspects. Difficult patient. Russian journal (Trudnyy patsient). 2010; 3: 100–1. (in Russian)
16. Beker Aydemir T., Chang S.M., Guthrie G.J., Maki A.B., Ryu M.S., Karabiyik A., Cousins R.J. Zinc transporter ZIP14 functions in hepatic zinc, iron and glucose homeostasis during the innate immune response (endotoxemia). PLoS One. 2012; 7(10): e48679. doi: 10.1371/journal.pone.0048679.
17. Chasovskikh N.Yu., Ryazantseva N.V., Kaygorodova E.V., Chechina O.E., Sokolovich E.G., Novitskiy V.V. Status of MAP kinases JNK and p38 in mononuclear blood leukocytes in inflammation. Medical immunology. Russian journal (Meditsinskaya immunologiya). 2009; 11(6): 515–22.