УДК 616.594.15–092:612.015.7]–08

N. Kiladze[1], A. Katsitadze[1], L. Abrahamovych[2]
[1] Tbilisi State Medical University
[2] Danylo Halytsky Lviv National Medical University

Imbalance of Some Trace Elements and Their Correction in Alopecia Areata

Introduction. Prevalence of alopecia areata (AA) in the structure of all diseases in general population is 0.1-0.2 %, alopecia areata is responsible for 0.7-3.0 % of patients observed by dermatologists [6, 8], it is the most common cause of hair loss, affecting 30.0-40.0 % of people under the age of 50, in recent period there is a strong tendency to increase the incidence. Alopecia areata is the most frequent cause of inflammation-induced hair loss, affecting both children and adults and hair of all colours, but historically it has been more prevalent in the younger age groups [3]. It may occur as a single, self-limiting episode or may recur at varying intervals over many years. AA may be associated with nails abnormalities, such as pitting and longitudinal or transverse striations. Sometimes, concurrent atopic disorders, diabetes mellitus and other autoimmune disorders may alter the course and prognosis. Complex interactions between predisposing genetic and environmental factors likely contribute to the induction of immune-mediated response [4]. In recent years, many authors have noted the link between alopecia and the deficiency of some trace elements [9]. Physical properties of the hair, their shape, color, thickness, elasticity, growth rate depend on the microelement composition. Hair without sufficient zinc content do not grow, without selenium and silicon they become thinner, brittle, and the excess silicon level may increase the "waviness" of the hair. The disruption in the metabolism of copper and manganese are associated with premature graying of hair. T. Malova [1] found that all inspected children with alopecia had a pronounced imbalance of trace elements. The author proves the deficiency of such essential micronutrients as iron, manganese, copper, zinc, calcium, as well in 100.0 % of children was identified a lack of selenium. Trace elements are essential cofactors for multiple enzymes and have a role in important functional activities within the hair follicle. Further, zinc accelerates hair follicle recovery and is a potent inhibitor of hair follicle regression [3]. Iron and zinc are the well-known trace elements that are associated with hair shedding [3, 5]. In spite of the fact that several studies were done on the effect of trace elements in AA, a definite result was not obtained. Therefore, in this study, we tried to investigate the relationship between AA and some trace elements in population of two regions in Georgia and Ukraine. At the same time, we are going to propose our approach in the treatment.

Materials and research methods. In this study were enrolled 23 patients with single patches of hair loss and 1 with subtotal variety in the age from 20 up to 30 from the same two geographical zone, all of them were females. All patients were subjected to full history taking (personal, past history of any illness or medications, family history, and history of present illness), all cases were clinically diagnosed as typical lesions of alopecia areata. Persons with metabolic disorders, anemia or with dyed before hair did not participate in the study. All patient were informed about the aim of the study and participation was voluntary. The samples of the hair, approximately about 1 g, were obtained from 4-5 places of the occipital area of the scalp and studied by x-ray fluorescent spectrophotometer. Features of microelement status were based on the determination in the hair of 28 elements divided in three groups – essential (Ca, Zn, K, Fe, Cu, Mn, Cr), additional (S, Br, Cl, Co, Ag, V, Ni, Rb, Mo, Sr, Ti) and toxic (Ba, Pb, As, Hg, Cd, Sb, Zr, Sn, Bi). In accordance to the received data all patients were treated orally in order to correct the imbalance of trace elements and Chophitol, topically all of them were treated by mesotherapy method with soluble trace elements (Mesosystem S. A. and Mesoestetic (Spain)). Injections in the areas of hair loss were made once in 5 days and with physiotherapy -D'Arsonvalization with soluble trace elements (Labcatal) once a day during 10 days course.

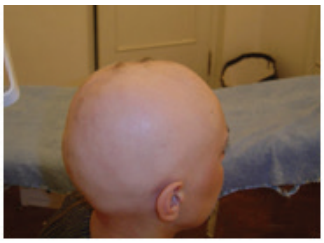
Results of the investigation and their discussion. All our studied patients were of the same age group and from the same two geographical areas. The duration of hair loss varied from one week to one year. In the majority of the cases onset of hair loss was sudden and followed by a slow progression, only one of them had recurrent lesion after a short remission. In 23 cases the initial lesion of alopecia areata was a single circumscribed patch of

baldness mainly located on the temporal or occipital region. The scalp was affected first in 88.0 % of cases, in 12.0 % the first location was followed with damage of nail plates. Only one patient had the subtotal variety. In the study was fixed the significant decrease in the means of such elements as zinc, selenium, sulfur and higher concentration of lead, copper and cadmium. In two cases from Georgia was fixed the increased level of mercury. The increased intake of lead, cadmium, and copper may lead to zinc deficiency due to zinc antagonism to these elements. lead replaces zinc on haeme enzyms, as well lead competes with calcium, inhibiting the release of neurotransmitters and interferes with regulation of cell metabolism by binding to second-messenger calcium receptors, blocking calcium transport by calcium channels and calcium-sodium ATP pumps. It seems that even slight increase of toxic metals within permissible levels may shift the balance of essential trace elements such as so needed for skin zinc and selenium, which is important in the synthesis of selenoproteins as well as glutathione peroxidase (GSH-Px) and thioredoxin with antioxidant properties essential in the body's defense mechanisms [8]. Distinct lack of selenium was observed in all patients from Georgia, most possible because it is the iododeficiency region, and iododeficiency regions are characterized simultaneously by a low content of selenium in the soil and water. It is determined that selenium has a synergistic effect on the metabolism of iodine, which is essential for the assessment of diseases of the thyroid gland [2, 3, 5].

As a rule patients with AA are treated with topical, intralesional and systemic corticosteroids, topical irritants, topical minoxidil, PUVA and others. However for many patients therapy is limited by poor efficacy and sometimes problems with toxicity. In our research all patients orally were treated individually in accordance with the deficiency with trace elements. For topical treatment were used mesotherapy and physiotherapy. Mesotherapy was provided by preparations of Mesosystem S.A. and Mesoestetic (Spain) once in 5 days. At the first step injections were done very superficially in the technique of micropapules on the perimeter following the border of the skin and hairy area with an interval at 1.0-1.5 cm, at the second step – injections with tracer technique in the sites of hair loss.

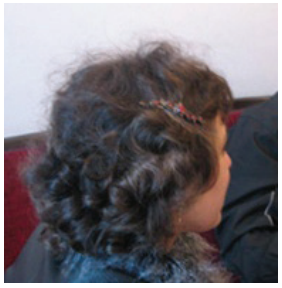
The course of treatment was individual, the period of observation was within one year, but control visits each month. The therapeutic effects were evaluated through the extent of vellus hair and terminal hair regrowth on the scalp. We graded the therapeutic effects in four varieties:

1) Marked recovery: cosmetic satisfaction or terminal hair regrowth of more than 60.0 % on the hair loss patch; 2) Partial recovery: terminal hair regrowth less than 60.0 % on the hair loss patch and 3) Poor recovery: only vellus hair regrowth on the hair loss patch; 4) No recovery. By the end of the first month of treatment in most patients (67.0 %) was observed abundant growth of lanugo, over the next three months – the growth of long pigmented and non-pigmented hair. In all the observed cases by the end of 3 months of treatment there was significant improvement, lesions decreased in size, the fuzz gave way to a growth of long hair, depigmented hair gave way to pigmented. In 89.0 % of cases the 4-5 month foci of alopecia was closed completely, in 11% of cases the complete closure of the lesions took another 2 months. Within one year observation no case of recurrent hair loss was fixed.



Before treatment

4 month treatment



1 year from beginning of treatment

Conclusions. The present study suggests that trace elements supplementation could become an adjuvant therapy for the AA patients with their low levels and for whom the traditional therapeutic methods have been unsuccessful. Mesotherapy with its principle of minimal doses of drugs provided to the right place is an effective method of treatment and allows to achieve the lasting positive results with the restoration of the thickness and quality of hair.

Literature

1. Малова Т. А. Роль нарушений микроэлементного гомеостаза в патогенезе развития алопеции у детей / Т. А. Малова // Проблемы дерматовенерологии и медицинской косметологии на современном этапе. – Владивосток, 2005. – С. 111–112 (Malova T. The Role of Microelement Homeostasis Disorders in the Pathogenesis of Alopecia in Children / T. Malova // Problems of Dermatology and Medical Cosmetology at Present. – Vladivostok, 2005. – P. 111–112).
2. Assay of trace elements, thyroid gland and blood indices in children with alopecia / R. Naginiene, R. Kregzdyte, A. Abdrakhmanovas, S. Ryselis // Trace Elements Electrolytes. – 2004. – Vol. 21. – P. 207–210.
3. Bruske K. Zinc and its status in some dermatological diseases: a statistical assessment / K. Bruske, K. Salfeld // Zeitschrift für Hautkrankheiten. – 1987. – Bd. 62. – P. 125–131.

4. Combs G. F. Jr. The role of selenium in nutrition / G. F. Jr. Combs, S. B. Combs. – N.Y. : Academic Press, 1986. – 544 p.
5. Decreased serum ferritin is associated with alopecia in women / J. Kantor, L. J. Kessler, D. G. Brooks, G. Cotsarelis // J. Investig. Dermatol. – 2003. – Vol. 121, N 5. – P. 985–988.
6. Incidence of alopecia areata in Olmsted County, Minnesota, 1975 through 1989 / K. H. Safavi, S. A. Muller, V. J. Suman [et al.] // Mayo Clin. Proc. – 1995. – Vol. 70, N 7. – P. 628–633.
7. Influence of physiological dietary selenium supplementation on the natural course of autoimmune thyroiditis / D. Nacamulli, C. Mian, D. Petricca [et al.] // Clin. Endocrinol. (Oxford). – 2010. – Vol. 73, N 4. – P. 535–539.
8. Safavi K. Prevalence of alopecia areata in the First National Health and Nutrition Examination Survey / K. Safavi // Arch. Dermatol. – 1992. – Vol. 128, N 5. – P. 702.
9. Trace element levels in alopecia areata / Y. J. Bhat, S. Manzoor, A. R. Khan, S. Qayooni // Indian J. Dermatol. Venereol. Leprol. – 2009. – Vol. 75. – P. 29–31.

Стаття надійшла до редакції журналу 17 листопада 2015 р.

Imbalance of Some Trace Elements and Their Correction in Alopecia Areata

N. Kiladze, A. Katsitadze, L. Abrahamovych

Alopecia areata is the most frequent cause of inflammation-induced hair loss, affecting both children and adults and hair of all colors, but historically it has been more prevalent in the younger age groups. It is a recurrent, nonscarring hairloss considered to be an autoimmune process. Although alopecia areata is one of the most common autoimmune diseases, the pathobiology of disease is not fully understood, but there are claims that imbalance of trace elements may trigger the onset of this disease. The aim of the study was to assess the level of some trace elements in the hair of patients with alopecia areata and to propose some methods of correction of the identified deficiency. In the trial were included 23 patients with single patches of hair loss and 1 with subtotal variety in the age from 20 up to 23 from the same two geographical zones. Levels of trace elements were studied in the hair by x-ray fluorescent spectrophotometer. Treatment was provided orally and by mesotherapy method and physiotherapy and in all cases it was successful.

Keyword: alopecia areata, trace elements, mesotherapy.

Дисбаланс деяких мікроелементів та його корекція при вогнищевій алопеції

Н. Кіладзе, А. Кацітадзе, Л. Абрагамович

Вогнищева алопеція – одна з найчастіших форм випадіння волосся запально-індукованого характеру, що трапляється у 0,05–1,0 % населення в будь-якому віці, але перші прояви частіше спостерігаються у дітей та молоді. Незважаючи на те що у виникненні вогнищевої алопеції головну роль відіграють автоімунні процеси, повністю її патобіологія не вивчена. Існує також думка, що виникнення захворювання може провокувати дисбаланс мікроелементів. Оцінювали рівень 28 мікроелементів у волоссі пацієнтів з вигнищевою алолпецією та вивчали деякі методи корекції виявленого дефіциту. Спостерігали 23 пацієнтів з одним вогнищем випадіння волосся та один випадок субтотального облисіння у віці від 20 до 30 років. Усі пацієнти з ідентичного ґеоґрафічного реґіону. Рівень мікроелементів вивчено за допомогою рентґен-флюоресцентного спектроґрафа. Проведено загальне лікування мікроелементами; для місцевого лікування використана мезотерапія препаратами Mesosystem S.A. та Mesoestetic (Іспанія). У всіх випадках лікування було успішним.

Ключові слова: вогнищева алопеція, мікроелементи, мезотерапія.