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The Validity of Multivitamin Supplements in Children with Atopic Dermatitis

This article focuses on providing children with atopic dermatitis with all macro-and micronutrients necessary for the complex development of the body. The problem of nutrition is relevant in these patients, since they need to comply with the hypoallergenic diet. The authors demonstrate the results of tehir own research of vitamin provision of children with allergic diseases and correction of hypovitaminosis. It is shown that the use of multivitamin suplementation not only doesn't aggravate the disease due to the risk of allergic reactions, but actually contributes to a long-term remission.

***Key words**: atopic dermatitis, hypoallergenic diet, vitamin deficiencies, correction, multivitamin preparations, children.*

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One of the factors contributing to the severity of atopic dermatitis, is the lack of vitamins in foods, and their loss if food was not properly cooked, as well as rapid growth of the child's body. An additional factor is the hypoallergenic diet, which is administered to children and aggravates the shortage of certain vitamins [1-3].

Insufficient intake of vitamins and minerals from food requires the use of multivitamin complexes to ensure the normal functioning of a child's body. The results of population-based studies conducted by the Institute of Nutrition, showed an extremely low consumption and increasing of cumulative deficit of vitamins (A, group B, C, E) and trace elements (iron, zinc, iodine) among the significant proportion of Russian population [4]. At the same time detectable deficit often comes from combined vitamin A deficiency. Rational and balanced nutrition for children and adults is the most important condition for maintaining the health of the population.

If you there is needed long-term compliance with elimination diet, which virtually eliminates the creation of a physiologically meaningful diet, it is extremely important to

thoroughly correct the energy value of food and micronutrient (vitamins, minerals, essential amino acids, polyunsaturated fatty acids, etc.) composition [5-9].

It is shown that the vitamin supply of children with allergic diseases is lower than that in healthy children [10, 11]. Thus, the study of the effectiveness of vitamin complexes use in order to correct vitamin status in children is an outstanding problem [10,11].

This survey was carried out in the Child Health Science Center. Inspection and supervision of children was conducted in the Department of rehabilitation of children with allergic diseases and respiratory diseases of Institute of Preventive Pediatrics and Rehabilitation and in the Department of nutrition and healthy and the sick child of CHSC, RAMS.

This survey presents the results of clinical observation, assessment and treatment of 120 children with atopic dermatitis aged 3 to 6 years.

Inclusion of patients into this study took into account the following indicators: the presence of atopic dermatitis during 12 months or more prior to inclusion in the study; no consistent effect on the ongoing standard therapy; presence of any clinical evidences of atopic dermatitis during the last 3 months or more, before the inclusion in the study; compliance with hypoallergenic elimination diet and treatment at home; compliance of the patient.

In order to perform the research, all children underwent general clinical, allergological and immunological inspection; there were determined levels of certain water-soluble (B1, B2, B6) and fat-soluble (A, E) vitamins, and there was also performed an ultrasound lesion on the skin.

Ultrasound examination assessed the degree of thickening of the skin as a whole and its individual segments, the clarity of their differentiation, changes in echogenicity and echostructure, as well as the existence and nature of intra-and subcutaneous blood flow.

The evaluation of the chemical composition and energy value of hypoallergenic diets was performed using the tables from "The chemical composition of Russian food" Handbook [12].

Among the observed children boys dominated – there were 68 boys (56.6%), and 52 girls (43.4%) (Table 1). All patients had atopic dermatitis, in the common form. In 91 patients (75.8%) disease duration was more than 3 years, and in 29 (24.2%) - less than 3 years (see Table 1).

Easy course of atopic dermatitis was observed in 13 (10.8%) patients, moderate course - in 81 (67.6%), severe - in 26 (21.6%)

Heredity for allergic disease (asthma, atopic dermatitis, allergic rhinitis, hay fever) was burdened for the majority of patients (103, 85.8%).

Elimination mode in home was not followed in 82 (68.4%) children.

Rating the severity of skin manifestations in atopic dermatitis was conducted according to generally accepted clinical data (scientific and practical program "Atopic dermatitis in children: diagnosis, treatment and prevention," 2004) and to the system SCORAD (Scoring of Atopic Dermatitis), developed by the European Working Group.

Assessment of the severity of atopic dermatitis by SCORAD system in patients scored 79.53 points on average.

It is established that observed patients with atopic dermatitis often revealed concomitant sensitization to domestic and pollen allergens, as well as domestic and epidermal allergens. The average level of total immunoglobulin (Ig) E was 689 ± 101 IU / ml.

Analysis of actual dietary intake of children having atopic dermatitis

The basic principle of diet in the period of marked clinical manifestations of atopic dermatitis is to forbid intake of causally-significant products that have a high sensitizing activity (elimination).

From the standpoint of the modern theory of adequate nutrition, diet should be balanced and meet the needs of the body and its of enzyme systems possibilities concerning quantity and quality of nutrients, the nature of cooking food, and feeding rhythm. In case of the disease clinical nutrition must take into account the pathogenetic mechanisms of disease, the status of various organs and systems.

Table 2 shows the basic food groups, that are most often limited or excluded from hypoallergenic diets, as well as the associated potential nutrient deficiencies in the diet.

Analysis of the chemical composition of the standard hypoallergenic diet [13] showed, that it matches the child's needs for essential nutrients and energy and certain vitamins (B1, B2, C) (Fig. 1). The content of vitamins A and E in the diet does not exceed the standard 50% of age needs of the child (probably largely due to the exclusion of the supply of eggs and offal). When individual diet is assigned (dairy-free, gluten-free, with the exception of other non-tolerable products) the content of vitamins in the diet of the child reduces even more.

Analysis of dietary intake was performed for 87 children. In assessing the diets both quantitative and qualitative composition of the diet was considered.

Appointment of a hypoallergenic diet is known to be a prerequisite for adequate replacement of eliminated product and balance of power. Analysis of elimination diets observed for 87 patients showed that diet only of 11.5% observed children included all major nutrients and met age requirements. As it can be seen from the data presented in Fig. 2, the children surveyed frequently (19.2%) had excessive caloric intake - 10% or more excess of recommended intakes, while altogether such rations were quite fairly balanced. Energy-deficient diets were found for

16.3% of children, while significant number of children had diet with deficiency of protein (24.8%).

The cause of malnutrition in 29% of patients were dietary restrictions associated with intolerance to certain foods and the lack of their full replacement. Along with the exception of the non-tolerable products without adequate replacement patients had essential loss of appetite (18%), including selective appetite loss for individual products until the complete rejection of certain, especially new, products. This phenomenon is described in the literature as food neophobia, is considered to be characteristic of children aged 3-6 years, especially in the presence of food allergy.

Table. 3 shows the results of assessing the actual diets of children on the content of vitamins studied. The actual nutrition of all children surveyed was deficient in one or more vitamins, and the severity of deficit amounted to 80% of the age requirement.

Lack of vitamin content in the diets of children with atopic dermatitis, that was revealed in the analysis of standard hypoallergenic diet and dietary evaluation, confirmed the reliability of their actual vitamin status on the content of vitamins in the blood serum.

The low provision of the vitamins is affected by such factors as the additional loss of vitamins during storage and improper heat treatment, not full vitamin assimilation by the child in the presence of gastrointestinal forms of food allergies, etc.

Therefore, children of the study group need additional donations of vitamins as in the acute phase of illness against a background of significant dietary restrictions, as during the remission for a sufficiently balanced diet.

Vitamin supply of the observed children having atopic dermatitis

Determination of vitamins (B1, B2, B6, A, E) in serum

During the study it was found that in only 5 children (4.1%) there was indicated an adequate supply of all vitamins studied, and in 49 (40.8%) – vitamin provision was below the middle-aged values (Table 4).

Isolated decrease of vitamin E in serum was found in 47 patients studied(39.1%), decrease of vitamin B1 - in 76 (63.3%) patients having atopic dermatitis.

So, almost all the examined patients revealed a deficiency of vitamins B6, B2, A, and more than half of patients did not receive enough vitamins B1 and E, which along with lack of vitamins in the diet confirms the need for correction of vitamin status of sick children having atopic dermatitis.

Ultrasound examination of the skin

Ultrasound examination of the skin, that was carried out during exacerbation of atopic dermatitis in all patients, clearly showed thickening of the skin, mainly due to the dermis; blurred

layers of the skin; the epidermis increased echogenicity while dermis decreased echogenicity with a characteristic hypoechoic stripe in the surface boundary, which can be considered as a marker of the process activity. There is visualization of arterial and venous intradermal and subcutaneous blood flow.

Correction of vitamin A deficiency in patients with atopic dermatitis

As a standard therapy of atopic dermatitis, all patients received antihistamines and membrane preparations, and other medicine intended to improve or restore the function of the digestive system; they also received external therapies, including topical corticosteroids. Individual hypoallergenic diet was assigned to all patients, and they were recommended mode of elimination in the home.

Patients were divided into 2 groups of 60 persons. In addition to a comprehensive conventional therapy of atopic dermatitis, patients in group I received vitamin complex Pikovit Complex (KRKA, Slovenia).

Vitamin preparation was administered in a special age dosage, duration of use was 4 weeks**.**

Table 5 shows that the number of studied vitamins (B1, B2, B6, B12, A and E) in Pikovit is close to the daily needs of children.

The efficiency of complex therapy with vitamin preparations

Clinical efficacy of treatment was evaluated by improvement of the status and well-being of the child; reduction and / or disappearance of symptoms of itching and atopic dermatitis on the skin, increase of content of the studied vitamins in the blood serum, improvement and / or restoration of properties of the skin revealed by its ultrasound.

The results showed that the use of the drug being studied vitamin for 1 month in combination with other pharmacological agents prevented the adverse effects that could be caused by interaction of the vitamin components with other drugs. Found that in their application is not noted any adverse (side) effects.

The results showed that 1 month of use of the studied vitamin drug in combination with other pharmacological agents prevented the adverse effects that could be caused by interaction of the vitamin components with other drugs. It was found that there were no adverse (side) effects in their application.

Assessment of therapy effectiveness in observed children

***Clinical effectiveness*.** In Group I of children using multivitamin preparation effectiveness of therapy was 81.3%, and the itching was gone by the 7-9th day, sleep became calm by the end of the week, the skin manifestations were reduced beginning 4-5-day of intake, and by the 13th day skin has been completely clear; SCORAD was 7,1 points. Clinical

efficacy of therapy in patients from comparison group was 76%, while itching was gone by the 11th day, the sleep became calm, atopic manifestations on skin began to decline from 6-8-day and by 18-21-day skin wass completely cleared, SCORAD was 9,4 points (Table 6).

Vitamin supply of the observed children with atopic dermatitis

Level of vitamins (B1, B2, B6, A, E) in serum

The level of vitamins B1, B2, B6, A and E in another study, that had place 1 month later, significantly increased in patients of group I who received vitamin complex (Table 7).

The level of vitamins B1, B2, B6, A and E in another study, that had place 1 month later, remained virtually unchanged in patients of group II, while maintaining the basic microsympthoms of vitamin deficiency.

When multivitamin complex was included into the complex therapy of atopic dermatitis, clinical efficacy was achieved by the end of the 2nd week from the beginning of their use, although dryness lasted. Clinical efficacy was observed only by the 21st day of therapy in the children of group 2, who received conventional therapy; but their skin remained dry, lichenification and vitamin deficiency microsympthoms remained, and content of vitamins in the blood serum did not change.

According to the results of the study it was found that the standard antiallergic therapy was less effective than that with the introduction of additional vitamin preparation.

Ultrasound examination of the skin

Ultrasound examination of skin in patients of group I, who received multivitamins, revealed persistent slight thickening of the skin and blurred boundaries of its walls, its echogenicity and echostructure normalized. Intradermal and subcutaneous blood flow is not recorded. Ultrasound examination of the skin, carried out after 1 month in patients of group II revealed that the thickening of the skin is the same, as well as blurred boundaries of the epidermis layers; increased epidermis echogenicity and decreased dermis echogenicity remained. Visualization of blood flow in subcutaneous and intradermal vein remained.

The results of this work confirmed the need for correction of vitamin status in children with atopic dermatitis. It was found that appointment of a multi-vitamin complex helps to the achieve clinical efficiency in a shorter time and to restore the normal structure of the skin.

Therefore, inclusion of vitamin complexes into the treatment of atopic dermatitis in children should be seen as an integral component of complex therapy.

The use of vitamin supplements in patients with atopic dermatitis is fully justified: on one hand, there is presence of vitamin deficiency, on the other hand, there is opportunity to achieve long-term disease remission along with polyhypovitaminosis liquidation.

The results suggest that vitamin supplements are safe and their use in combined therapy in children with atopic dermatitis increases the effectiveness of the treatment.

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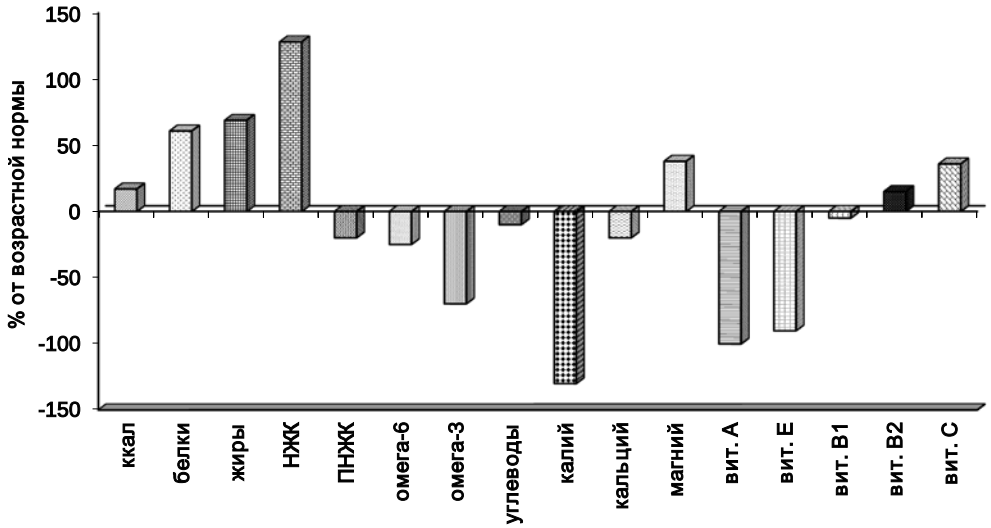
Fig. 1. Chemical composition of the standard hypoallergenic diet



Note: UFA - unsaturated fatty acids, PUFA - polyunsaturated fatty acids

Fig. 2. Analysis of dietary intake of children with atopic dermatitis

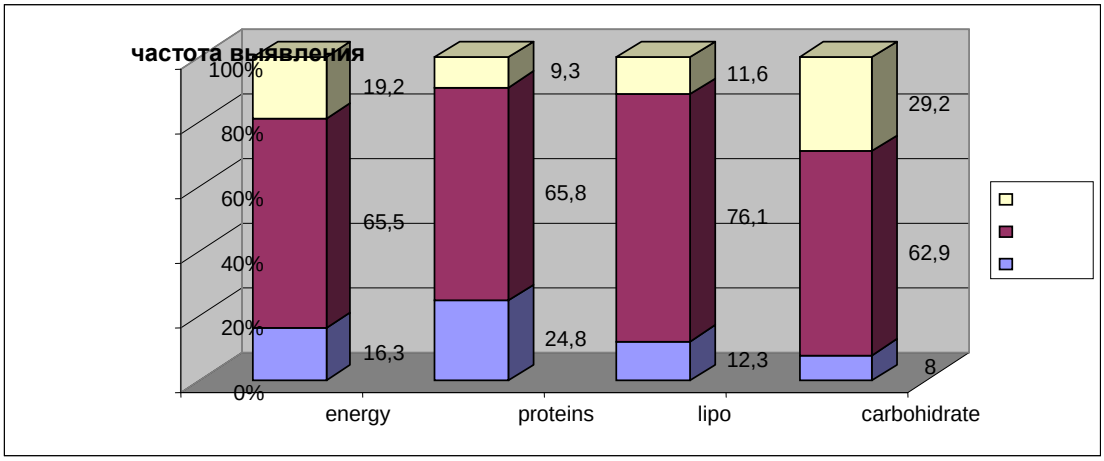


Table 1. Clinical characteristics of patients with atopic dermatitis (n = 120)

Clinical characteristics		**Numberof children**	
		n	%
Severity level of AD	Light	13	10,8
	Average	81	67,6
	Severe	26	21,6
Duration of disease	> 3 years	91	75,8
	< 3 years	29	24,2
Burdened allergological anamnesis		103	85,8
Compliance with elimination regime at home		38	31,6
Observation of an allergy specialist		87	72,5

Table 2. The products that are most often excluded from hypoallergenic diets and the resulting shortages of macro-and micronutrients

Product groups	**Deficiency of nutrients in the diet**
Milk, cheese, soar milk drinks	Animal protein, calcium, vitamins A, D
Fish and Seafood	Animal protein, ω-3 fatty acids, iodine, vitamins A, D, Group B
Eggs	Animal protein, fats, phospholipids, vitamins B1, B2, B12, C, D, E, A
Grains (cereal, pasta and pastries, bread)	Vegetable protein, selenium, B vitamins, tocopherol
Citrus fruits, brightly colored fruits and vegetables	β-carotene, ascorbic acid, dietary fiber

Table 3. The content of vitamins in the diets of patients aged 3-6 years with atopic dermatitis

Vitamins	**Recommended intakes ***	**Actual consumption (M±m)**	**Incidence of deficiency (%)**
B_1, mg	0,9	0,4±0,1	51,7±6,0
B_2, mg	1,0	0,6±0,1	45,9±7,0
B_6, mg	1,2	0,7±0,1	47,1±6,1
A, mkg ret. equiv.	500	280±22,1	49,4±4,3
E, mg tok. equiv.	7,0	3,1±0,3	65,5±7,3

Note * - The rules of the physiological requirements for energy and nutrients for different groups of the Russian Federation ratified. December 18, 2008 *(MR 2.3.1.2432-08).*

Table 4. Provision of vitamins for all children with atopic dermatitis at admission

Vitamins	**Criteria for an adequate supply**	**Number of children vitamin level below normal**	
		n	**%**
B_1	≥ 0,8 mg	76	63,3
B_2	≥ 0,9 mg	93	77,5
B_6	≥ 0,9 mg	107	89,1
A	≥ 450 mkg	95	79,1
E	≥ 4,0 mg	47	39,1
Deficiency of all vitamins		49	40,8
Adequate supply of all vitamins		5	4,1

Table 5. Vitamin content in the studied vitamins

Vitamins	**Age consumption norms***	**Polyvitamin complex**
B_1	0,8−0,9 mg	0,7 mg
B_2	0,9−1,0 mg	0,8 mg
B_6	0,9−1,2 mg	1,0 mg
B_{12}	0,7−1,5 mkg	0,7 mkg
A	450−500 mkg	400 mkg
E	4,0−7,0 mg	4,0 mg

Note * - The rules of the physiological requirements for energy and nutrients for different groups of the Russian Federation ratified. December 18, 2008 (MR 2.3.1.2432-08).

Table 6. The effectiveness of the therapy of atopic dermatitis (ADT)

Indicators	**I group**		**II group**	
	Лечение			
	befor e	after	before	after
SCORAD index	80,2	7,1	72,7	9,4
Remission duration (mon)	3,8	6,1***	3,6	3,4
Exacerbation frequency (per year)	4,8	1,6***	4,8	4,5
Severity level of AtD	*Efficiency, %*			
Light	100		100	
Average	79,8		71,2	
Severe	64,2		56,8	
Total	81,3		76	

Note. *** - Reliability of differences between parameters before and after treatment, $p \leq 0,01$.

Table 7. Dynamics of vitamins B1, B2, B6, A and E in serum

Vitamins	**I group**		**II group**	
	Treatment			
	before	after	before	after
B_1, mg	0,71	0,79	0,7	0,66
B_2, mg	0,79	0,87*	0,8	0,8
B_6, mg	0,77	0,87*	0,78	0,77
E, mg	0,35	0,4*	0,38	0,35
A, mkg	359,0	467,0***	352,0	335,0

Note. Significance of differences between parameters before and after treatment, $p^{***} \leq 0,005$; $p^{*} \leq 0,05$.