

Application of the Specialized Food Product at the Professional Eczema at the Workers in the Ferry Production

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Abstract

The studies were carried out with the participation of workers of pearlite production, suffering from occupational eczema (165 people of the main group and 152 people from the comparison group who do not have skin pathology). Considering the important role of pathogenetically substantiated and balanced nutrition in the treatment and prevention of a number of skin diseases, one of the promising areas is the development and introduction of qualitatively new food products with a directed change in the chemical composition corresponding to the needs of the organism working in specific adverse working conditions. In addition, the use of specialized products in the complex of preventive measures is aimed at optimizing the adaptive reserves of the working organism, reducing vascular permeability, enhancing the body's resistance to toxins. As a result of the inclusion in the diet of a specialized food product, dietary preventive nutrition in the form of jelly containing pectin, vitamins A, E, zinc, and biologically active substances of plant origin, among those examined on the background of a course of complex therapy its positive effect on the nutritional status indicators, indicating the optimization of metabolic processes characterizing the pathogenesis of the skin inflammatory process, has been established. Thus, the concentration of ascorbic acid in the blood serum statistically significantly ($p < 0.05$) increased by 30.0%, tocopherol - by 36.3%, carotenoids - by 27.3%, phosphorus - by 28.9%. There was a decrease in the level of MDA in the blood serum by 12.3% ($p < 0.05$) and an increase in catalase activity by 12.2% ($p > 0.05$), which indicates the normalization of the equilibrium of the system "lipid peroxidation - antioxidant protection" enhancing adaptation reserves and body resistance to toxins. A tendency to a decrease in pruritus, infiltration, erythematous and eczematous manifestations of the disease was noted. The data obtained allow us to consider the use of a specialized food product of dietary preventive nutrition by pearlite production workers as a means of enhancing the body's adaptation reserves and preventing the occurrence, progression and development of occupational skin diseases (eczema) in production.

Keywords: Pearlite Production; Treatment-And-Prophylactic Nutrition; Adaptation; Biochemical Parameters; Occupational Diseases; Eczema

Introduction

Eczema production workers (165 people in the main group and 152 from the control group without skin pathology). It has been shown that it has been shown that it is important to of a person working in specific adverse conditions. In addition, it is possible to reduce the

amount of fat that is in the body. Included in the form of a healthy diet. Influence of individual laboratory values, demonstrating the metabolic processes, which characterize the pathogenesis of skin inflammation.

Thus, the concentration of ascorbic acid in blood serum statistically significant ($p < 0.05$) increased by 30.0%, tocopherol by 36.3%, carotenoids by 27.3%, and phosphorus by 28.9%. There was a 12.3% reduction in the blood pressure (12.5%), indicating the balance of the lipid peroxidation is an antioxidant protection system that enhances resistance to toxins. There was a tendency to reduce itching, infiltration, erythematous eczematous manifestations of the disease. It is a process to reduce the amount of skin that is lost the workplace.

The frequency of development of allergic dermatoses continues to grow, occupies one of the leading places in the structure of occupational morbidity of workers and has a pronounced socio-economic importance. Analysis of data from national statistics, as well as epidemiological studies of various sizes, suggests that eczema occupies a leading place among occupational allergic dermatoses [1,2].

In general, in the construction industry, skin diseases account for 24 - 37% of cases of total morbidity; at the same time, workers are exposed to the combined effect of harmful chemical and physical irritants of the allergenic and toxic nature of low intensity in combination with an unfavorable microclimate and dustiness of the working area air that can cause pathological changes on the skin and in the body [1].

It should be noted that the complex and combined nature of the effects of chemicals on the body, the characteristics of toxicokinetics, population and individual sensitivity to chemicals determine the peculiarities of metabolic reactions that determine the predominance of detoxification processes or the activation of chemical compounds that affect the period of formation and course of occupational allergic dermatoses.

In the etiology and pathogenesis of occupational eczema, the main role is played by the influence of a certain production factor. Unlike other occupational allergic dermatoses with occupational eczema, the increased sensitivity of the delayed type reaches considerable intensity, as evidenced by pronounced clinical manifestations, as well as more significant changes in allergological and immunological tests. If at the onset of the disease in patients, hypersensitivity is, as a rule, monovalent, then in the future it becomes bi- or polyvalent.

Immunological and morphological studies conducted in the diagnosis of occupational eczema indicate that inflammatory changes in the dermis are not specific and fit into the general pathological characteristics of tissues in nonspecific inflammation.

Under the influence of increased vascular permeability of the predominantly terminal section of the microcirculatory bed, spongiosis of the epidermis develops with the penetration of lymphocytes into it, the clinical and morphological manifestation of which is microvesiculation. Gross changes of the destructive order under the influence of inflammation do not develop, perivascular lymphoid-histiocytic infiltrates of the papillary dermis are noted; at the same time, a decrease in the number of T-lymphocytes and a decrease in their functional characteristics are recorded in the peripheral blood. All this indicates the possibility of complete reversibility of inflammatory phenomena [1,2].

In recent years, it has been shown that the pathogenetic mechanisms of development of occupational eczema are based on the disturbance of enzyme systems, activation of free radical processes, reduction of antioxidant protection and immune reactivity, developing under the influence of chemical industrial substances in the early stages of the development of skin pathology, which determines the need for a wide range of preventive measures, including the use of pathogenetically substantiated and balanced nutrition [3-7].

The principles of treatment-and-prophylactic nutrition are based on the data on the specific effect of individual nutrients on the intensity of absorption of toxic substances entering the body during production, on the accumulation of these substances in tissues and their elimination from tissues and blood. Most of the toxic substances in the human body undergo transformations during the reactions of oxidation, reduction and hydrolytic cleavage in the liver and other organs and tissues.

Some chemical compounds or their metabolites react with endogenous molecules and radicals to form non-toxic soluble substances released with urine, bile, or exhaled air [4,8,9].

Extremely important in modern conditions is the use of biologically active substances capable of performing a protective role in the adverse effects of the environment on the body [4,9,10]. Also, one of the promising ways to improve the health care of workers is the development and implementation of high-quality new foods with directed changes in the chemical composition corresponding to the needs of the organism in specific adverse working conditions [5,11,12].

In this regard, the purpose of this study was to assess the effectiveness of the use of a specialized food product in the diet of workers of perlite production with professional eczema based on a study of the dynamics of indicators of nutritional and clinical status.

Materials and Methods

As an object of research, the plant of OAO Stroyperlit (Mytishchi, Moscow Region) was chosen. Natural material perlite is a rock that represents volcanic glass. Direct production contact with perlite causes inflammation of the skin due to traumatization, irritation and blockage of the excretory ducts of the sebaceous and sweat glands of the skin of workers, which, in combination with unfavorable working conditions, determine its dermato-pathogenic properties.

The main group (165 people) consisted of workers in the main professions: crushers of thermal insulating raw materials, burners in the production of thermal insulating materials, sorters (packers) of thermal insulating products with professional eczema exposed to the complex effects of adverse environmental factors. All examined were male, the average age was 53.5 ± 0.6 years, work experience in the perlite workshop - 27.6 ± 0.96 years.

The course of the disease in all subjects of the main group was moderate, according to the dermatological EASI index (Eczema Area Severity Index). The clinical picture was dominated by the phenomena of pronounced infiltration, accompanied by cracks, vesiculation, weeping; maceration of the stratum corneum, resulting in the formation of foci of various sizes of bright red color, shiny, moist; skin color in lesions was bluish-red or brown. The comparison group consisted of workers of similar professions who do not have skin pathology (152 male subjects examined; average age - 50.4 ± 1.25 years; average length of service - 24.6 ± 1.87 years).

The study was carried out for 4 weeks. In addition to the course of therapy according to standardized regimens (antihistamines, desensitizing agents, enterosorbents, external therapy, physiotherapy, etc.), the main group of patients of the main group received daily (in the morning) a specialized food product of koselny dietary preventive nutrition (LEOVIT Nutrio, RF); certificate of state registration RU.77.99.19.004.E.004963.10.16 dated 10.31.2016), prepared by stirring 2 tablespoons of powder (20 g) in 1 cup of boiling water (Table 1).

Nutrient	100g dry product	In 1 serving (20g)	
		Content	% of SSP*
Energy value, kcal	350	70	3
Carbohydrates, g	93	19	5
Vitamin A, mg	13,5	2,7	337,5
Vitamin E, IU	30	6	60
Zinc, mg	30	6	40

Table 1: Nutritional value of specialized food product of dietary preventive nutrition.

*: Average daily need.

The composition of the investigated product includes: sugar, potato starch, apple, vegetables (beets, carrots), oatmeal flour, acidity regulator (citric acid), flavoring (apple); Active ingredients of kissel are represented by a set of dermatotropic plant components that have a tradition of food use: licorice root extract (*Glycyrrhiza glabra*), *Rhodiola rosea* extract (*Rhodiola rosea* L.), burdock root (*Arctium lappa*), lemon balm leaf (*Melissa officinalis*), horsetail grass (*Equisetum arvense*), turns grass (*Bidens tripartita*), dandelion root (*Taraxacum officinale*). Along with this, the product contains components responsible for inhibiting lipid peroxidation processes in cell membranes (vitamin E), providing local specific and nonspecific immunity (vitamin A), maintaining normal skin condition (zinc).

Examined from the comparison group studied the product was not received.

In the course of the study, the protein and mineral metabolism and serum enzyme activity on the Metrolab 2300 automatic biochemical analyzer (Metrolab, Argentina) were evaluated twice using the domestic and foreign test systems of the examined main group and the comparison group.

The body's availability of vitamins was assessed by serum concentration: ascorbic acid, determined by visual titration, retinol and carotenoids - by a Bessey micromethod modified by A.A. Anisimova, α -tocopherol - by the fluorescence method of R.Ch. Chernyauska not [13].

Antioxidant status was assessed by the activity of blood catalase, determined by the spectrophotometric method according to MA Korolyuk [14], by the content of secondary products of lipid peroxidation - malonic dialdehyde in the blood by the method of M. Mihara in the reaction with thiobarbituric acid [13].

The processing of the data was performed using the statistical functions package in the Windows environment. The statistical significance of the differences of compared values was assessed by student's criterion.

Results and Discussion

The results of biochemical studies showed that the content of total protein and albumin in the serum of the subjects was within the normal range and did not change during the study (Table 2).

The change in protein fractions in the percentage of globulins noted before the start of the study (background period) may indicate an immune restructuring associated with a change in the activity of the primary immunity. At the end of the 4-week course of taking a specialized product, a statistically significant decrease in the relative content of α 2- and γ -globulins was observed among the workers of the main group.

After taking the specialized product, the main group examined a tendency to decrease in AST and ALT activity by 4.0 - 5.5 U/l ($p < 0.10$).

An analysis of the initial vitamin provision of workers allowed us to establish the following patterns: a reduced level of ascorbic acid was determined in 67% of subjects, retinol - in 24%, α -tocopherol - in 27%, beta-carotene and carotenoids - in 70%. Moreover, only 10% of the surveyed were fully provided with all the studied vitamins. A deficiency of one of the determined vitamins was found in 28% of cases, and 55% of the examined had a combined deficiency of two or three vitamins.

The application of a specialized product showed a statistically significant increase in serum α -tocopherol by 36.3%, the amount of carotenoids by 27.3% and ascorbic acid by 30% to a level above the lower limit of normal. The number of polyhypovitaminosis states decreased 1.4 times.

The analysis of mineral metabolism indicators showed that the concentration of macronutrients in the initial survey was located near the lower limit of the norm, which, apparently, is due to the poor nutrition of workers or the action of industrial contaminants. Against the

Indicator	Norm	Core group		Comparison group	
		Background Period	Through 4 weeks	Background period	Through 4 weeks
Total protein, g/l	65 - 85	77,9 ± 2,3	73,76 ± 2,0	79,3 ± 2,6	76,4 ± 2,1
Albumin, g/l	53 - 66	49,6 ± 3,2	47,6 ± 2,5	48,5 ± 3,4	46,4 ± 2,7
α1-globulins, %	2 - 4	2,7 ± 0,5	2,9 ± 0,7	2,5 ± 0,4	2,3 ± 0,5
α2-globulins, %	6 - 9,5	10,1 ± 1,3	9,4 ± 2,1*	9,6 ± 1,3	9,3 ± 1,4
β-globulins, %	7,5 - 13	16,0 ± 2,1	13,6 ± 0,6	14,7 ± 1,3	13,2 ± 1,8
γ-globulins, %	14 - 22	19,1 ± 1,5	17,4 ± 1,1*	18,6 ± 1,6	17,6 ± 1,5
Bilirubin, mol/l	5,5 - 20,5	12,9 ± 1,5	10,4 ± 2,4*	16,0 ± 2,1	18,8 ± 1,7
ACT Activity, U/L	0 - 40	32,3 ± 2,1	28,3 ± 1,9	31,1 ± 1,9	30,4 ± 2,0
ALT activity, U/l	0 - 40	36,4 ± 1,7	30,9 ± 2,2	37,1 ± 2,3	38,4 ± 1,7
Activity alkaline phosphatase, Units/l	< 117	75,4 ± 2,5	67,8 ± 3,1	83,2 ± 2,9	87,1 ± 2,7
Ascorbic acid, mg/dl	0,7 - 1,0	0,60 ± 0,1	0,78 ± 0,08*	0,61 ± 0,09	0,65 ± 0,07
α-tocopherol, mol/l	11,6 - 46,4	10,2 ± 1,5	13,9 ± 1,7*	10,1 ± 1,2	10,9 ± 1,3
Retinol, mcg/dl	30 - 70	35,9 ± 2,7	39,0 ± 2,4	34,7 ± 2,3	35,7 ± 2,0
Carotenoids, mcg/dl	80 - 230	67,1 ± 4,0	85,4 ± 4,2*	66,5 ± 2,7	69,9 ± 3,0
β-carotene, µg/dl	20 - 60	15,0 ± 1,3	20,3 ± 1,5	15,3 ± 1,2	16,0 ± 1,5
Phosphorus, mmol/l	0,7 - 1,6	0,76 ± 0,1	0,98 ± 0,14*	0,70 ± 0,09	0,73 ± 0,07
Magnesium, mmol/l	0,7 - 1,0	0,77 ± 0,01	0,84 ± 0,05	0,75 ± 0,03	0,78 ± 0,04
Calcium, mmol/l	2,05 - 2,75	2,15 ± 0,20	2,50 ± 0,03	2,18 ± 0,05	2,30 ± 0,03
MDA, µmol/l	2,2 - 4,8	5,7 ± 0,3	5,0 ± 0,2*	5,8 ± 0,2	5,5 ± 0,2
Catalase activity, mkat/l	450 - 850	319 ± 31	358 ± 23	324 ± 29	332 ± 25

Table 2: Dynamics of biochemical indices for workers in pearlite production ($M \pm m$).

*: Statistically significant differences ($p < 0.05$) from the indicator in the background period.

background of the use of a specialized product in the blood serum of the subjects, a significant increase in the concentration of phosphorus was noted by 28.9% ($p < 0.05$) and calcium - by 16.3% ($p < 0.10$).

Along with this, as a result of the use of a specialized food product, significant changes were noted in the "lipid peroxidation - antioxidant protection" system.

In the main group of workers, the level of MDA in serum decreased by 12.3% ($p < 0.05$), and the activity of catalase increased by 12.2%, although the differences did not reach the level of statistical significance.

Workers with occupational eczema who received complex therapy in combination with the use of a specialized food product showed a tendency to a reduction in pruritus, infiltration, erythematous and eczematous manifestations of the disease. Adverse reactions and complications of therapy were not observed.

Based on the criteria for the effectiveness of complex therapy of workers with occupational eczema, 78% of people who were clinically cured included in the group with clinical recovery, and the skin manifestations of the disease had completely disappeared by the end of the application of the specialized food product. Other subjects of this group (22%) found a significant improvement in the condition of the skin with partial retention of some clinical symptoms: impaired pigmentation, dry skin and a slight peeling.

Conclusion

On the basis of the obtained results, it can be concluded that the use of a specialized food product of dietary preventive nutrition containing vitamins A, E and zinc and biologically active substances of plant origin, with professional eczema among those working on pearlite production, is quite high. An increase in the body's provision of workers with vitamins and carotenoids, mineral substances, an increase in the body's adaptation reserves in preventing the adverse effects of production factors and a decrease in lipid peroxidation have been established.

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