Glazunov O. A., Chebotar O. A. Estimation of the condition of parodontic tissues in miners using diagnostic express tests. Journal of Education, Health and Sport. 2017;7(3):570-575. eISSN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.556432
http://ojs.ukw.edu.pl/index.php/johs/article/view/4425

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26.01.2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

Received: 27.03.2017. Revised 28.03.2017. Accepted: 29.03.2017.

ESTIMATION OF THE CONDITION OF PARODONTIC TISSUES IN MINERS USING DIAGNOSTIC EXPRESS TESTS

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Abstract

An informative-evidence-based method for rapid assessment of periodontal tissue in miners is proposed. The efficiency of treatment-and-prophylactic complex with inclusion of “Biotrit C”, “Litcitin D3”, Vitamin Complex “Alphabet”is indicated. The complex mentioned allows to normalize functional reactions in the microcirculatory bed and simultaneously to increase the concentration of oxyhemoglobin and significantly reduce that of methemoglobin, improve the barrier function of the mucous membrane of the gum, which leads to reduction of inflammatory phenomena in the tissues of periodontium.

Key words: **express assessment, periodontal tissue, miners, spectrocalorimetry**.

Ore mining is one of the most dangerous fields of industry, where the risk of developing occupational and other pathologies is extremely high [1, 2].

In the present day literature there are isolated data on the condition of periodontal tissues in miners suffering vibration disease, but the problems of its detection frequency, clinical and diagnosis features, treatment and prevention of major dental diseases in miners of various occupations have not been studied yet [3, 4].

Human’s labor activity at the conditions of ore mining production is associated with a

combined effect on the body of such factors as dust pollution, vibration, etc. [5, 6]. With the development of an appropriate occupational disease, the adaptive capabilities of the organism deteriorate sharply, immunity decreases, changes occur at the microcirculatory level, and that leads to the development of nonspecific diseases.

Dental pathology associated with the working conditions is no exception.

Numerous researches of different authors in this sphere reveal that oral diseases in the persons working in ore mining industry occur 3-4 times more often than among other categories of workers [7, 8]. In this case, dust and vibration exercise the most non-physiological influence [5, 6, 7].

The objective – to conduct clinical and laboratory rapid assessment of the effectiveness of the treatment-and-prophylactic complex for the prevention and therapy of inflammatory processes in the periodontal tissues of ore mining industry workers.

Materials and methods. 2 groups of patients (56 persons aged 40-49 y.o.) from a specialized hospital of dispensary patients with a combination of bronchial asthma and vibration disease participated in clinical and laboratory studies. Patients were characterized by a phase of depletion of adaptation-compensatory reactions, reduction in oxygen consumption, metabolism of carbohydrates, proteins and lipids; polysyndrome pathology of the respiratory system, motor locomotive apparatus, peripheral nervous system, sensorinerual deafness, and genome's instability took place as well. The main group of patients (n =31) received the following therapeutic and hygienic complexes in addition to basic therapy: according to the scheme, for 1 month 3 times a year "Biotrit C", "Lecithin D3", vitamin comple["Alphabet", elixir "Lizodent", dental pastes "Pearls", "Lakalut Active", "Lakalut-Phytoformula", "Blend-a-Med Expert". The comparison group (n =25) received only basic therapy - sanitation of the oral cavity and professional hygiene.

Spectro-colorimetric method for assessing the degree of inflammation of the mucous gum was suggested in the research [9]. It is based on a change in the staining of the mucous gum with the Schiller-Pisarev's solution, which is reflected in the optical and color parameters of the mucous gum and is fixed quantitatively. The method of spectro-colorimetric evaluation of the functional state of the microcapillary bed was proposed in [10] and is based on the change in blood flow in the capillaries of the mucous gum under the action of a regulated masticatory load, which is accompanied by a change in its color and is fixed quantitatively in the form of optical and color parameters of the mucosa. Spectra of light reflections of the gingival mucosa and its color parameters were recorded with automatic spectrocolorimeter. Changes of spectra's reflection and associated parameters during the

prophylaxis procedure were averaged over the group.

Results and its discussion. The spectrocolorimetric studies of the microcapillary bed of the mucous gums of miners, performed in the initial state, showed that in most cases they had a "negative hyperemia" of the microcapillary bed to the regulated chewing load or absence of "positive hyperemia", a lower value (compared to the norm) of oxyhemoglobin concentration and presence of methemoglobin.

The complex therapy carried out within 1 month in the main group of miners led to the fact that the "negative hyperemia" of the microcapillary bed of the gingival mucosa, which was observed in their original state, practically disappeared (Table 1).

The results obtained were kept in 6 months. At the same time, in the comparison group, gum's "negative hyperemia" persisted at all stages of the observation.

Table 1

Change in the color coordinates of gums in miners under the influence of the masticatory load during treatment

Follow-up period	ΔX, ΔY, ΔZ	p
Initial state	-6.2 ± 0.7 -6.3 ± 0.7 -8.6 ± 0.7	p>0,1
In a month of therapy	+ 1.0 ± 0.2 + 0.9 ± 0.2 + 0.8 ± 0.2	p> 0.005
In 6 months	+ 1.6 ± 0.3 + 1.0 ± 0.2 + 1.2 ± 0.2	p> 0.05

Note: p - an indicator of the reliability of the difference in the changes after ML from the comparison group; "-" and "+" - respectively, reducing and increasing of color coordinates under the action of ML.

In Table 2 the data on the relative change in the reflection coefficient of the visible gingival mucosa in the middle areas of the short-wave region of the spectrum - 460 nm (venous part of the microcapillary bed) and the long wave - 660 nm (arterial part of the microcapillary bed) under Schiller-Pisarev's solution action in the miners of the main group and the comparison group in the process of treatment and prophylactic.

Table 2

Relative changes in the coefficient of light reflection of the mucous gum in miners under the influence of S-P's solution at the average wavelength of short-wave (460 nm) and long-wave (660 nm) part of the visible spectrum at different stages of treatment,%

terms / groups / observation	Wavelength, nm	Comparison group, n = 25	Main group, n = 31
Initial state	460	58%	57%
	660	71%	72%
In 6 months	460	60%	73%
	660	73%	86%
In 12 months	460	57%	75%
	660	70%	89%
In 2 years	460	60%	73%
	660	71%	87%

The data presented indicate a decrease in staining of the mucous gum in the main group of miners who received complex therapy 3 times a year, compared with the initial condition. This result indicates the improvement in their barrier protection of the mucous gum and, as a consequence, a decrease in the permeability of the mucosa for the dye, as well as a decrease in it the concentration of glycogen, which is a reserve polysaccharide in inflammation.

In addition, the most of the miners in the main group, as a result of the use of complex prophylaxis of dental diseases concentration of oxyhemoglobin in the microcapillary bed of the mucous gum, has increased with which a maximum of light absorption was associated in the region of 580 nm (minimum in reflected light), and decrease in the concentration or disappearance of methemoglobin was observed. The latter is associated with the maximum absorption of light in the region of 500 nm (minimum in reflected light), while the blood flow in its venous and arterial parts was slightly increased. Fig. 1 shows, as an example, the spectral distribution of the reflected light of the visible wavelength range of the mucosa of a particular miner of the main group in the initial state and in 6 months of observation. At the same time, in the comparison group the similar changes in the microcapillary bed of the mucous gum did not take place.

Conclusions. The therapeutic and prophylactic complex developed allows to normalize functional reactions in micro capillary bed, simultaneously increase oxyhemoglobin concentration in it and to reduce the concentration of methemoglobin, to strengthen the barrier protection of the mucous gum, which leads to decrease of inflammation and its permeability for dyes and microorganisms.

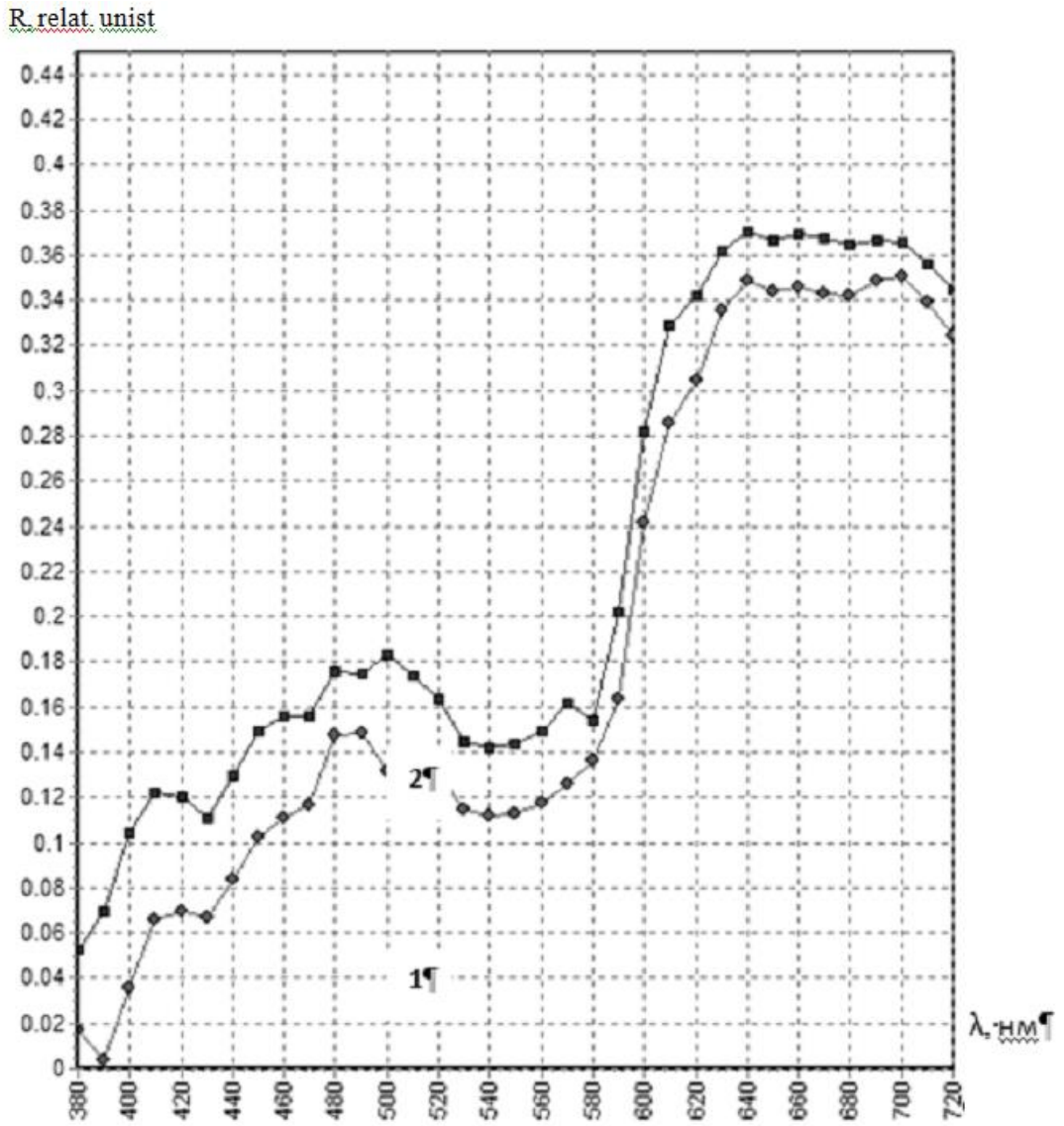

Fig. 1. Spectral distribution of the light reflection coefficient of the mucous gum of a specific miner of the main group: 1 - initial state; 2 - after 6 months of prophylaxis.

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