ТЕРАПЕВТИЧНА СТОМАТОЛОГІЯ

UDC 613.6.002.2:616.31
DOI https://doi.org/10.35220/2078-8916-2021-40-2.1

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TECHNOGENIC FACTORS OF THE WORK ENVIRONMENT AND THEIR IMPACT ON THE ORAL CAVITY

Various technogenic factors negatively affect the dental status of those workers who work in harmful conditions. Research results indicate that there is a gradual increase in the prevalence of diseases of the oral cavity that correlates with increasing length of service. The study of the prevalence and risk factors for the formation of various forms of pathology among professional groups employed at iron ore production enterprises is currently a relevant topic.

The aim. *To assess the state of oral hygiene and the activity of biochemical markers of the oral fluid in iron ore production workers; to reveal their correlation with the degree of exposure to harmful production factors.*

Materials and methods. *The study involved 256 workers aged 20 to 60 years with work experience of 5–20 years, which constituted the main group of the surveyed. The level of the hygienic state of the oral cavity was assessed using the hygienic index proposed by Yu. A. Fedorov and V.V. Volodkina (1971), the Stallard (1969) index, and the J. Silness (1964), H. Loe (1967). In the oral fluid, biochemical markers were evaluated – the activity of catalase (a marker of the state of the antioxidant system) and lysozyme (the level of nonspecific resistance).*

Research results and discussion. The level of oral hygiene among industrial workers was significantly worse than the comparison group. n the oral fluid there is a significant decrease with age of miners activity of the enzyme catalase, a marker of antioxidant system and lysozyme, which reflects the level of nonspecific resistance, indicating a weakening of the body's defenses and the formation of conditions for pathology of oral organs and tissues.

Key words: *iron ore production, oral cavity.*

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ТЕХНОГЕННІ ФАКТОРИ ВИРОБНИЧОГО СЕРЕДОВИЩА ТА ЇХ ВПЛИВ НА ПОРОЖНИНУ РОТА

Різні техногенні фактори мають негативний вплив на стоматологічний статус робітників, які працюють у шкідливих умовах. Результати численних досліджень свідчать про поступовий зріст розповсюдженості захворювань порожнини рота зі збільшенням робочого стажу. Вивчення розповсюдженості та факторів ризику формування різних форм патології серед професійних груп, які зайняті на підприємствах залізорудного виробництва, є актуальним. ***Мета дослідження*** *– оцінити стан гігієни порожнини рота та активність біохімічних маркерів ротової рідини у робочих залізорудного виробництва, виявити Їх взаємозв'язок зі ступенем впливу шкідливих чинників виробництва. Матеріали та методи дослідження. Обстежено 256 робочих промислових залізорудних підприємств у віці від 20 до 60 лет, стаж роботи складав 5–20 років. Стан гігієни порожнини рота оцінювали згідно гігієнічного індексу Ю.А. Федорова та В.В. Володкиної (1971), индексів Stallard (1969) та J. Silness(1964), H. Loe (1967). У ротовій рідині оцінювалися біохімічні маркери – активність каталази (маркер стану антиоксидантної системи) і лізоциму (рівень неспецифічної резистентності).*

Результати дослідження та їх обговорення. *Рівень гігієни ротової порожнини серед робітників промислових підприємств був значно гірший, ніж у групі порівняння. У ротовій рідині відзначається істотне зменшення з віком гірників активності ферменту каталази, що є маркером антиоксидантної системи і лізоциму, що відображає рівень неспецифічної резистентності, що свідчить про ослаблення захисних сил організму і формування умов для зростання патології органів і тканин порожнини рота.*

Ключові слова: *залізорудне виробництво, порожнина рота.*

Relevance of the topic. Various technogenic factors negatively affect the dental status of those workers who work in harmful conditions. This causes a more pronounced intensity of caries, non-carious lesions of the teeth, periodontal and oral mucosa diseases. Research results indicate that there is a gradual increase in the prevalence of diseases of the oral cavity that correlates with increasing length of service [1; 2].

The study of the prevalence and risk factors for the formation of various forms of pathology among professional groups employed at iron ore production enterprises is currently a relevant topic [3; 4; 5; 6].

The main pathogenetic factor of the onset and development of diseases of the hard tissues of the teeth is considered to be dental plaque and the waste products of microorganisms, which constitute its basis. This factor shifts the emphasis of preventive complexes to hygienic education of the population, to professional oral hygiene, and competent development and appointment of sound methods and techniques of personal hygiene with mandatory motivation of the patient to carefully follow the recommendations of the dentist.

Objective of the study: to assess the state of oral hygiene and the activity of biochemical markers of the oral fluid in iron ore production workers; to reveal their correlation with the degree of exposure to harmful production factors.

Research materials and methods. The study involved 256 workers aged 20 to 60 years with work experience of 5–20 years, which constituted the main group of the surveyed. Among them there were persons suffering from dust bronchitis (sampling size – 95 cases), dust bronchitis combined with vibration sickness – 96 workers, and vibration sickness only – 65 workers.

The control group consisted of 79 employees who had indirect contact with harmful production factors of an industrial facility, comparable by age and gender.

To determine the hygienic state of the oral cavity in modern dentistry, numerous special indices have been developed. They display the state of oral hygiene in quantitative terms.

The level of the hygienic state of the oral cavity was assessed using the hygienic index proposed by Yu. A. Fedorov and V. V. Volodkina (1971). The Stallard (1969) index, which takes into account the area of plaque, and the J. Silness (1964), H. Loe (1967), indexes taking into account the thickness of plaque, were also used.

The change in the elemental composition of saliva plays an important role in the etiology of dental diseases. In the oral fluid, such biochemical markers as the activity of catalase (a marker of the state of the antioxidant system) and lysozyme (the level of nonspecific resistance) were assessed. The activity of catalase in the oral fluid was determined using a method based on the ability of hydrogen peroxide, which did not react with catalase, to combine with molybdenum salts forming a stable orange complex. The color intensity is proportional to the catalase activity, which was expressed in mkat/L of the oral fluid [7].

Determination of the activity of lysozyme in the oral fluid was carried out by a bacteriological method based on the ability of lysozyme to lyse bacteria. When lysozyme interacts with a substrate of Micrococcus lysodeikticus, the substrate gets cleared, which is recorded spectrophotometrically. The degree of clearing is proportional to the activity of lysozyme, which was expressed in units/ml of oral fluid [8].

Statistical processing was carried out by methods of correlation and cluster analysis using standard Statistica 6.0 software packages [9].

Research results and their discussion. It should be noted that all examined patients had an insufficient level of oral hygiene and the intensity of periodontal tissue damage increased with age.

The hygienic index (HI) among workers of the main group over 40 years old exceeds 2.6 points, which indicates the lack of regular oral care and indicates a poor level of hygiene.

The level of oral hygiene when comparing the main group and the comparison group was significantly worse in the main group (see Table 1). So at the age of 30–39 and 40–49 years, the Silness-Loe index was, respectively, in the main group 1.72±0.09 and 2.1±0.1, and in the comparison group 0.99±0.05 and 1.04±0.05.

It should be noted that in the age group of 30–39 years old, the dentition and the state of hard tissues were well preserved, however, the hygienic state of the oral cavity organs turned out to be unsatisfactory. Analysis of personal data both in the control and in the main groups showed that not more than 68% of the respondents regularly brushed their teeth. Almost all the surveyed persons changed their toothbrush once a year, while using various toothpastes. The dietary habits and the nature of the food did not differ significantly in the main and control groups.

The biochemical parameters of the oral fluid and blood serum also testify to a significant effect on the health of miners caused by the duration of their work in mining conditions (Fig. 1, Fig. 2).

In the oral fluid, there is a significant age-correlating decrease in the activity of the catalase enzyme, which is a marker of the antioxidant system, as well as lysozyme, which reflects the level

Table 1

Condition of hard tissues of teeth and oral hygiene

Indexes	Group	30-39 years old	40-49 years old	50-59 years old	60 years and older
CFE[1], c.u.[2]	Control	10.2±0.8	13.8±1.0	15.7±1.0	–
	Main	12.1±0.8*	15.6±0.8*	16.4±1.0	23.2±1.7
Silness-Loe, score	Control	0.99±0.05	1.04±0.05	1.8±0.09	–
	Main	1.72±0.09*	2.1±0.1*	2.1±0.1*	2.3±0.1
Stallard, score	Control	1.2±0.06	1.3±0.06	1.9±0.09	–
	Main	1.8±0.09*	2.7±0.13*	2.1±0.11	2.2±0.11

*Note: * – differences with the comparison group are statistically significant (p<0.05)*

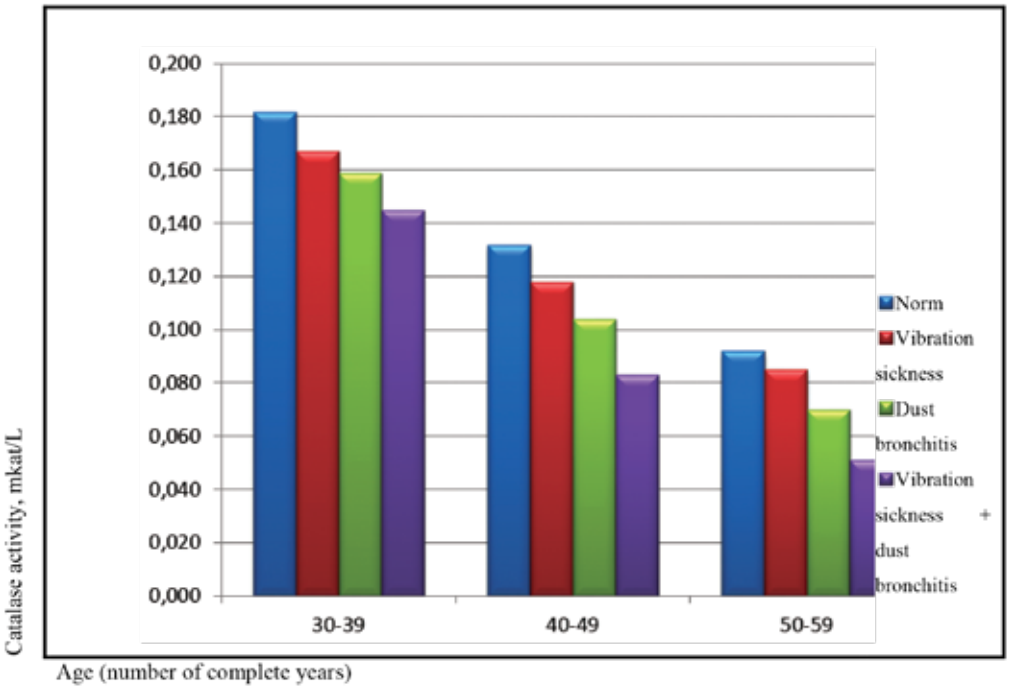

Fig. 1. Age dependence of catalase activity in the oral fluid of the mining industry workers

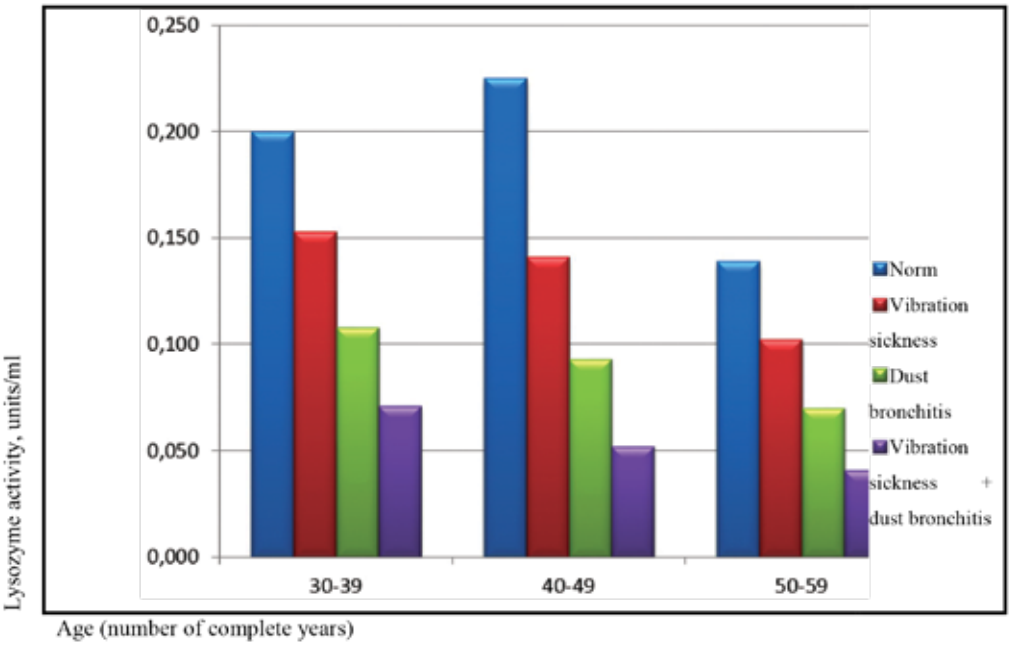

Fig. 2. Age dependence of lysozyme activity in the oral fluid of the mining industry workers

of nonspecific resistance, both of which indicate a weakening of the body's defenses and the formation of conditions for the growth of pathologies of organs and tissues of the oral cavity.

Conclusions. The examined patients were characterized by an insufficient level of hygiene and a close correlation between the intensity of damage to hard dental tissues with age ($r=0.7$ $p<0.05$). Analysis of the results of epidemiological surveys in miners showed a constant increase in the prevalence of signs of pathology in the hard tissues of the teeth and oral fluid.

Prospects for further research. The obtained results of the study can be used to optimize the existing model of maintaining the dental health of workers at iron ore enterprises in the region and to develop a rational complex of therapeutic and prophylactic measures.

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