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Impact on Health of Working Conditions in Various Industries (Review of Literature)

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Abstract Since the end of the 20th century, scientific papers have been published more often to study the influence of adverse production factors on the state of general health, including dental health, of workers in various industries associated with especially dangerous, dangerous and harmful working conditions. The authors emphasize that the features of development, the nature of complications and the outcome of the pathology of the oral cavity in workers of various enterprises are determined by harmful substances that pollute the air of the working area.

Keywords Gingivitis, Human labor, Dental caries, Periodontitis, Ulcerative and hypertrophic forms

1. Introduction

The study and evaluation of the factors of the production environment on the body of workers in enterprises. The high prevalence of various diseases, including occupational diseases in the working population requires special attention to the conditions and nature of human labor activity and their impact on health. The conditions and nature of the production activity performed are considered as the leading factor leading to the formation of occupational and non-occupational non-communicable diseases, which attract special attention due to the wide prevalence and large social consequences - disability and mortality of the adult population [23,35].

A large number of scientific publications are devoted to studying the impact of various types of chemical industries, including the production of petrochemicals, mineral fertilizers, phosphorus, synthetic monomers, synthetic rubber and tires, rubber products, pulp and paper. In addition, there are also works related to the issues of strengthening the dental health of workers in ferrous and non-ferrous metallurgy, mechanical engineering, industrial heating boilers, and confectionery industries [15,43].

In a number of cases, it has been shown that people with harmful working conditions, compared with control groups (the absence of harmful substances that adversely affect the body, including the organs of the oral cavity), reveal deeper pathological changes, the level of dental morbidity increases with the increase in work experience in harmful production [2,52].

In his research Ladutko A.V. [22] conducted a dental examination of 300 employees of an enterprise with organofluorine compounds. The author found that the prevalence of caries was 100.0%, non-carious pathology 80.0%, periodontal disease 84.0%. A mild degree of periodontitis was observed mainly with an experience of less than 15 years (14.8%) and was not diagnosed with an experience of more than 24 years; the average severity of periodontitis was observed in 28.0% of persons with work experience from 5 to 14 years; with a work experience of 15-24 years, there was mainly an average and severe degree of periodontitis (25.0%); The largest number of people with severe periodontitis was found among those with more than 30 years of work experience (12%).

The combined effect of production factors on the oral cavity of workers in industrial heating boiler houses was studied by Egiy V.V. [13]. He found that in the complex of factors determining working conditions in this production, the heating microclimate, noise, vibration, and harmful substances polluting the air of the working area played a leading role. They have an increase in the threshold of electrical excitability of the pulp of intact teeth, a decrease in tactile, pain, temperature sensitivity of the gums and taste reception of the tongue, and a decrease in salivation.

Agafonov A.A. [1] studied the impact of unfavorable factors of the working environment on the workers of the heating plant. The author established a direct strong correlation between the prevalence of periodontal diseases and the concentration of sulfur dioxide in the air. Against the background of exposure to unfavorable environmental factors, there is a decrease in the level of sIgA and the activity of saliva lysozyme in workers of the heating plant.

The study of the influence of harmful factors of the working environment on the development of dental caries, periodontitis, ulcerative and hypertrophic forms of gingivitis in workers of the rubber products plant showed that the long-term influence of carbon black, talc, gasoline, thiuram

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D, benz (a) pyrene affects the activity of alkaline and acid phosphatase in saliva and leads to an increase in dental morbidity, notes V.A. Berezin. [4] in their research.

Particularly dangerous working conditions under the influence of radiation and chemical factors also cause a more pronounced intensity of dental diseases, especially periodontal and oral mucosa (OMD) diseases. The aggravating effect of the radiation-chemical factor on the development of periodontal diseases in workers with hazardous working conditions of a number of industrial enterprises of the nuclear and defense complex, nuclear power plants of the Russian Federation was revealed [35].

According to the research of Bezhina L.N. [3] published data on the influence of the radiation-chemical production factor on the dental status of workers. The author found that the prevalence of periodontal disease in workers under 45 increased by 81.2%, the intensity of periodontal disease up to 4.87%, the prevalence of OM by 7.2%. The need for treatment and extraction of teeth in the presence of a radiation-chemical factor is 87.5%, in the treatment of periodontal diseases 76.4%, in preventive dental measures 100%, in dental prosthetics 68.0%.

On the same contingent Balkarov A.O. [2] studied the need and structure of dental orthopedic rehabilitation methods and found a higher need for those working in hazardous working conditions compared to normal working conditions - 88.0% and 80.0% for people aged 55-64 years.

A comparison was made of the dental status of workers in contact with radiation hazardous production factors and those working under normal working conditions at an industrial enterprise. A slight increase in the frequency of periodontal diseases, oral mucosa and non-carious lesions of the teeth in workers in contact with radiation hazardous working conditions was established [34].

As a result of her research, Dubinina L.M. [12] established an insufficient level of dental care among the population aged 20-39 years (40.8%) in one of the cities with a nuclear industry core enterprise. The average number of untreated teeth was 2.56, extracted teeth not restored with dentures 1.86. The author points to outdated designs of dentures among residents - steel stamped and soldered dentures in 63.6% and steel with spraying in 51.0%. 84.5% of the prostheses were in good condition.

Leskov A.S. [27] analyzed the dental morbidity of Russian petrochemical workers. The author believes that the high intensity of caries, the presence of foci of acid necrosis of hard dental tissues, inflammatory periodontal diseases and pathological processes of oral mucosa are associated with an increased content of carbon monoxide, sulfur dioxide, nitrogen dioxide, formaldehyde, phenol, hydrochloric and sulfuric acid vapors in the air of the working area.

Amirkhanov T.N. [2011] studied the impact of harmful production factors at the enterprises of the pulp and paper industry on the dental morbidity of workers. In parallel, for comparison, the same studies were carried out among the population living in the area where this plant is located. The impact of a complex of harmful factors is accompanied by a decrease in the parameters of local immunity, a change in blood microcirculation, a violation of tissue trophism and oral mucosa, followed by the development of dental caries, inflammatory periodontal diseases and diseases of the mucous membrane of the lips and tongue.

The workers of the northern gas fields of Siberia of the Russian Federation Makeev A.A. [29] found a high intensity of caries (KPU 14.35) mainly due to extracted teeth and periodontal diseases in combination with a low level of oral hygiene (IGR-U 2.53); high prevalence of OM diseases (13.6%), non-carious lesions (24.9%). A satisfactory level of dental care for shift workers has been established. The morbidity of shift workers exceeded that of residents of the base cities of residence of shift workers and increased with the length of service. The quality of life of shift workers according to the OHIP-14 questionnaire corresponded to satisfactory, with a deterioration in the quality of life to "unsatisfactory" among workers with a long work experience in the North. The following need for dental treatment and prosthetics for shift workers was identified - dental filling 26.9%, endodontic treatment 45.8%, tooth extraction 31.9%, occupational hygiene, drug treatment of periodontal diseases 43.9%, surgical treatment periodontitis 50.2%, in the treatment of oral mucosa 13.6%, in orthopedic treatment 68.9%.

2. Materials and Methods

The study of the dental health of aircraft manufacturing workers in the Russian Federation made it possible to assess the relative risk and the share of occupational factors in the formation of dental diseases, to determine changes in immunological and biochemical parameters. The working conditions at the enterprise were characterized by exposure to chemicals that have a unidirectional effect on the body with a summation effect, as well as exposure to noise and vibration. The authors believe that the main signs of the impact of harmful factors of aircraft manufacturing on the dental status of workers were the unsatisfactory hygienic condition of the mouth and the high prevalence of periodontitis with a predominance of moderate and severe forms of periodontal damage [9].

According to the researchers, the high prevalence of dental diseases among the workers of the Green Marble Mine in India, in addition to the main production factors (noise, dust, harmful substances, poor maintenance of equipment), was also determined by occupational stress, age, addiction to alcohol and malnutrition [55].

Other researchers from India published the results of studies on the relationship between the prevalence of periodontal disease and work stress in workers subject to compulsory social insurance in the system of the State Insurance Corporation. The authors revealed a high prevalence of periodontitis associated with occupational stress. They recommended that health authorities and the Indian Ministry of Labor make dental care accessible and considered as an integral part of primary health care, while

recommendations for employers focused on measures to reduce stress at work [59].

Among workers at a battery factory located in Egypt, it was found that a significant prevalence of periodontal disease was also the most common side effect of chronic exposure to lead fumes and dust on the health of oral tissues and organs in workers at this factory [58].

Researchers in Thailand studied the factors that affect industrial workers' access to dental care. It is shown that 63.9% of employees did not visit a dentist during the year. The authors, using the method of multivariate logistic regression analysis, proved that the place of work and residence, the presence of caries and acute toothache in history, transport accessibility, as well as previous experience of treatment at the dentist [57] affect the level of negotiability [57].

The highest intensity of dental caries and poor oral hygiene were found in oil and gas drillers and oil and gas processing workers in the Republic of Kalmykia, Russian Federation, who are affected by drilling mud fumes, noise and vibration. This was exacerbated by regional nutritional factors - high consumption of meat and fish in the diet, and low consumption of plant foods, dairy products, manifested by the intensity of dental caries and significantly worse indicators of the hygienic and clinical state of periodontal tissues [50].

Shatskoy N.V. et al. [52] conducted dental examinations of 53 workers and engineering and technical workers involved in the production of cadmium phosphors and having industrial contact with cadmium and its compounds. stomatitis, yellow-gold ring-shaped staining of the marginal gums, tooth enamel, changes in the structure of dentin. A high prevalence of diseases of the hard tissues of the teeth and periodontium was established in all examined, which significantly correlated with the duration of work with occupational hazards.

Up to 100% high prevalence of dental caries and periodontal disease is observed in metallurgical workers in the production of refined copper. The main reason for the high dental morbidity of workers employed in copper production is the impact of a complex of factors in the working environment.

Zhurikhina I.A. [14] studied the peculiarities of the influence of industrial environment factors on lipid metabolism, the state of free radical oxidation, antioxidant protection, and immunological parameters in tire workers. The author revealed changes in the factors of local immunity, a decrease in the level of zinc and copper in the oral fluid and a high dental morbidity among workers.

Workers of chemical production (Monomer RF plant) Kabirova M.F. [2013] established a high prevalence of OM and periodontal diseases.

It should be emphasized that the construction boom caused a widespread increase in the production of cement, the harmful components of which have a negative effect on the organs and systems of the body, including the organs of the dentoalveolar system. It has been established that the sulfuric anhydride present in its composition destroys organic and mineral compounds. A direct link was established between the influence of sulfuric anhydride on the development of dental diseases, leading to tooth loss in case of untimely treatment. In this regard, special preventive measures and conditions have been developed that should lead to a decrease in the development of dental morbidity among cement industry workers [19].

Astakhova M.I. [2001] studied the dental morbidity of workers in the barium, lime and cement industries. It is noted that chemicals in the air of the working area, both in the form of condensation aerosol and disintegration aerosol, create an unfavorable background and contribute to the emergence or aggravation of the existing non-professional dental pathology. At all industrial enterprises studied by the author, the prevalence of periodontal pathology among workers was 100%.

On the example of the age groups of 20-34 and 35-44 years, a situational analysis of dental morbidity among workers of city-forming enterprises with hazardous working conditions in the Siberian region of the Russian Federation was carried out. Detailed characteristics of the condition of the teeth, periodontium and other tissues, and organs of the dentoalveolar system are given. Conclusions were drawn about the high need for dental prophylaxis and treatment of young people working in hazardous working conditions, the importance of timely preventive work in children's and educational institutions of closed administrative-territorial entities [38,39].

The degree of influence of chemical occupational factors on the development of allergic diseases in medical workers of the Sverdlovsk region of the Russian Federation was assessed. According to the results of certification of 145 workplaces of medical organizations in this area, it was found that medical workers most often came into contact with chemicals that are pronounced allergens that have an adverse effect on health. In the formation of allergic diseases in medical workers, the leading role belonged to antibiotics, vitamins and other medicines, as well as formaldehyde; less commonly, sensitization to cotton dust and synthetic detergents is determined [23].

In order to study the dental status of the workers of the mining and processing plant, engaged in the extraction and processing of copper-zinc ores, a comprehensive dental examination of 235 workers of this production was carried out. A high prevalence and intensity of diseases of hard tissues of teeth, periodontal tissues and oral mucosa in miners engaged in the extraction and processing of copper-zinc ores was revealed, which correlates with the degree and duration of contact with harmful production factors [46].

Molvinskikh V.S. et al. [32] found that the state of organs and tissues of the oral cavity of workers in copper metallurgy is affected by the polyelement composition of dust in the air of working areas (Cu2+, Pb2+), drinking water, and low motivation to treat dental diseases. A high prevalence and intensity of the carious process and

inflammatory diseases of periodontal tissues in workers of the main workshops in copper metallurgy along with poor oral hygiene were revealed (OHI-S 2.75±0.67 in women and 3.50±0.75 in men), deteriorating with increasing length of service at the enterprise. The state of hard tissues of teeth and periodontal tissues of workers in copper metallurgy was determined by the physicochemical parameters of the oral fluid - osmolarity, acid-base balance, surface tension, ionic composition.

The authors studied the prevalence of five periodontopathogenic microorganisms in the contents of subgingival plaque: Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis, Tannerella forsythia, Treponema denticola, Prevotella intermedia in petrochemical industry workers with chronic periodontitis and to identify the relationship between the clinical manifestations of periodontitis and the microbial profile of periodontal pockets. In these workers, periodontal disease had features of the course associated with the influence of production factors. The most common microorganism was Porphyromonas gingivalis (77%), its presence was significantly associated with an increase in the depth of the periodontal pocket, loss of the level of epithelial attachment, and an increase in the bleeding index during probing. The relationship between periodontopathogens and clinical signs of chronic periodontitis has been established. No significant relationship was found between age, smoking and the clinic of chronic periodontitis. Harmful production factors had a significant impact on the development of inflammatory periodontal diseases in workers of the petrochemical complex [15].

Sabitova R.I. et al. [43] studied the mechanism of cytokine regulation in a chronic inflammatory process in periodontal tissues in petrochemical industry workers exposed to a complex of toxic substances. The object of the study were 373 employees of CJSC Pilot Plant Neftekhim with mild, moderate and severe periodontal disease. Among the workers of this plant, the authors revealed a significantly different imbalance of pro- and anti-inflammatory cytokines. Changes in the state in the status of cytokines made it possible to determine informative criteria that have a prognathic value in the oral fluid, contributing to the relief of inflammatory processes. The revealed changes testified to the disruption of adaptive processes and the development of clinical symptoms of periodontal disease.

Thus, the analysis of literary sources shows that in almost all industries there are occupational hazards that adversely affect the health of workers. This also applies to the organs and tissues of the oral cavity. In this regard, it is necessary to carry out preventive measures among workers to reduce dental morbidity and increase labor productivity.

Fundamentals of prevention of dental diseases among workers in various industries. Many years of experience in the prevention of dental diseases using state programs or in organized groups, as well as at the individual level, shows the high effectiveness of prevention, which reduces not only the intensity of caries and periodontal diseases, but also dental morbidity in general. Given the high efficiency of prevention of dental diseases among workers in various industries, numerous studies have been conducted on the prevention of diseases of the organs and tissues of the oral cavity.

Currently, there are primary, secondary and tertiary prevention of dental diseases among workers of various industries with occupational hazards of different nature. Based on the production factor, work experience, the state of the oral cavity of the employee, preventive measures are developed and implemented. In addition, in contrast to specific preventive measures, there are general measures that are divided into plant-wide, general shop and individual. The use of these preventive measures in combination leads to a decrease in dental diseases among workers, an increase in their quality of life and, as a result, an increase in labor productivity of this enterprise [7,18,31,49].

Khongorov V.A. [50] in their studies noted a higher efficiency of dental care provided in departmental institutions of the oil and gas industry, while the remaining categories of the population showed a predominant radicalization of treatment (the predominance of tooth extraction), an almost complete absence of preventive and hygienic motivations for seeking medical attention, and a decrease in the proportion of sanitized by 3 times.

Kuzmina I.N. [20] during the prevention of dental caries in different age groups achieved an improvement in oral hygiene and gums at all ages, as well as lengthening the interval between visits, a decrease in the number of foci of initial enamel caries in the active stage in 16-35 year olds by 62.5%. According to the author, the optimal system of individualized preventive measures for children, adolescents, adults, including workers of various industries, is a combination of organizational, diagnostic, and treatment-and-prophylactic measures that make it possible to offer a reasonable choice of an algorithm for the implementation of prevention and tactics of managing patients, depending on age, condition dental status and risk factors for dental caries in a particular patient.

Yarilkina S.P. [54] showed that in the absence of professional hygiene in adults against the background of insufficient individual oral hygiene, both with intact periodontal disease and with gingivitis, it worsens hygienic indicators by an average of 12.9% per year. Periodontal indicators in the initial gingivitis worsen to the same extent, and in the initially intact periodontium they go beyond normal values. The author believes that professional hygiene twice a year improves hygienic performance by an average of 21.2% and proportionally improves periodontal performance in gingivitis; with initially intact periodontium, normal periodontal parameters are preserved. Occupational hygiene three times a year improves the condition of hygiene and periodontium in persons with gingivitis to the greatest extent: by an average of 34.6% compared with the initial level. The lack of occupational hygiene caused localized and

generalized gingivitis in 56.3% and 25.0% of those examined with clinically healthy periodontium, and in the initial presence of gingivitis in 50.0% of cases contributed to its transition to periodontitis. According to her calculations, the medical effectiveness of double professional hygiene in the presence of gingivitis is 17.4%; triple professional hygiene increases medical efficiency up to 60.2%. The author argues that an individual conversation on oral hygiene is not effective enough to improve the quality of hygiene: the volume and methods of oral hygiene have changed little over the year of observation, however, the number of supporters of professional hygiene has increased by 29.2% with an increase in the multiplicity of 2 times a year.

Chavushyan K.D. [51] proposed an "Individual Hygiene Kit" consisting of a specially selected toothbrush, toothpaste, interdental brushes, floss, and a mono-bundle toothbrush specially selected by a periodontist. It provided prevention of recurrence of catarrhal generalized gingivitis in 100% after 6 months, in 85.2% of patients with mild periodontitis and 81.5% of moderate severity. After 12 months, this effect was somewhat reduced.

Leontiev A.A. [25] substantiated a program for the prevention of dental caries among workers in electroplating shops. In addition to sanitary and educational work, a comprehensive prevention program included the use of a complex of multivitamins and multiminerals "Complivit", "Calcium-D3 Nycomed" for one year. In the developed "Individual hygiene program for the prevention of dental caries among workers in galvanizing shops", the following were used: dental floss "Oral-B", toothpaste "Elmex protection against caries" with aminofluoride and "SPLAT Biocalcium" with bioactive Calcis, hydroxyapatite and omega-3-fat acids, manual toothbrush "Colgate 360", fluoride rinse "Colgate Plax Refreshing mint" and balm "Acepta adhesive". After the health education work among the studied contingent, the level of hygiene knowledge increased, but then there was a decrease in motivation, which was expressed in a decrease in the survival rates of hygiene knowledge for 12 months in the groups of "Programs for the Prevention of Dental Caries" from 79.4% to 46.4%.

Ibragimova F.I. et al. [16] came to the conclusion that, after analyzing their own and literature data, it can be said that under the conditions of production of synthetic detergents and cleaners, workers experience a decrease in the acid resistance of enamel, an increase in the electrical conductivity of hard dental tissues, a decrease in the resistance of gum capillaries and the index of peripheral circulation of the periodontium, which appear to precede the development of dental caries and periodontal disease among workers. Therefore, these violations can serve as integral indicators of the negative impact of production factors in the production of synthetic detergents and cleaning agents on the health and condition of the oral cavity of workers.

Leus P.A. [28] assessed the possibility of effective primary prevention of dental caries and periodontal diseases at the mass level in the Republic of Belarus. It was pointed out that these prevention programs should be based on current generally accepted knowledge about the etiology of diseases and include such components as a situational analysis, long-term measurable goals and a system for assessing the medical effectiveness of planned activities.

Pavlova N.A. [42] at a manufacturing enterprise (RF) implemented a complex for the prevention of periodontal diseases, including professional oral hygiene, selection of personal hygiene products, training in hygiene measures, local medical and surgical treatment of periodontitis. The author was able to show the clinical effectiveness of prevention of periodontal diseases in a year: the prevalence of periodontal diseases was reduced by 20.4%, the intensity of periodontal diseases according to CPI was reduced by 1.8 times, the index of oral hygiene - OHI-S was improved by 1.8 times. The prevention of periodontal diseases was especially effective up to 45 years. At the same time, the author notes the high assessment of the complex of prevention of periodontal diseases by the employees of the enterprise, but states that 13.1% of the employees refused a full-fledged dental medical examination due to the need for dental prosthetics and surgical methods for treating periodontitis.

Egiy V.V. [13] stating a high prevalence of periodontal diseases and functional overload of the masticatory apparatus due to extended defects of the dentition in workers of industrial heating boiler houses, applied calcium phosphate containing gel and Metrogyl Denta gel in the form of applications in the program for the prevention of dental diseases for this category of persons. in an individual splint according to the scheme in combination with individual and professional oral hygiene. The effectiveness of these measures for the prevention of caries and periodontal diseases has been established. In addition, by using Vertex molded plastic for the manufacture of removable denture bases in such workers, the author increased the strength and wear resistance of removable dentures and reduced the incidence of prosthetic stomatitis.

Kabirova M.F. [17] in the scheme of prevention of dental diseases and their recurrence used training in rational oral hygiene with the selection of agents according to the chemiluminescence of the oral fluid in chemical production workers; professional oral hygiene; sanitation of the mouth and prosthetics of defects in the dentition; anti-inflammatory therapy; keratoplastic therapy for leukoplakia; local immunocorrective therapy; normalization of the state of free radical oxidation; surgical treatment of periodontitis; cheilitis treatment; endogenous prevention of caries, inflammatory diseases of oral mucosa and periodontal tissues. The high clinical efficiency of the implementation of algorithms for the diagnosis, treatment and prevention of periodontal tissue diseases and oral mucosa was established, which was reflected in an increase in recovered individuals with verrucous and erosive leukoplakia by 21.9% and stabilization of the process in periodontal tissues by 18.6%. A significant improvement in the quality of life according to the OHIP-49-RU index in all components was revealed [13,24,36,48].

The authors conducted studies to assess the hygienic state of the oral cavity among workers in the metallurgical industry to determine the level of preventive care in the surveyed group under the influence of industrial risk factors. Depending on the presence of risk factors, the patient was recommended to carry out general preventive measures, means and methods that mitigate the effect of factors leading to the development of inflammatory periodontal diseases. The level of preventive care and the assessment of the dental status among the workers of the metallurgical production were determined, taking into account social and hygienic factors. In order to optimize the oral health of metallurgical workers, it is necessary to develop adaptive programs for the prevention of dental diseases, taking into account occupational risk factors [8,17,28,47].

Microbiological and clinical studies were carried out in 40 patients aged 19-30 years, all patients were examined according to a single scheme of clinical and index studies recommended by WHO. Toothpaste Lacalut Active Herbal had a high activity against inoculated microorganisms. After 2 weeks of using therapeutic and prophylactic agents, the hygiene index improved by 2.5 times. Before the start of the study, all patients had moderate chronic catarrhal gingivitis. The difference in the activity of the anti-inflammatory effect manifested itself after 2 weeks, under the influence of Lacalut Active Herbal toothpaste, the PMA index decreased by 13% and moved into the area of “mild gingivitis” [20,25,44,45].

The authors proposed a set of preventive measures to prevent the adverse effects of cadmium on hard tissues of teeth and periodontal tissue from the first days of professional contact, as well as general hygiene measures aimed at improving working conditions and the health of workers and engineering workers involved in the production of cadmium phosphors. The high efficiency of these preventive measures in this industry has been proven [52].

Makeeva I.M. and co-authors [30] in their studies proved that dental hygienic status, proper oral hygiene, choice of means and methods for implementing hygienic dental measures are essential in the prevention of oral diseases. The authors assessed the hygienic status of students of various courses and identified the sources they use to gain knowledge on oral care. Basic knowledge of oral hygiene and the principles of prevention of dental diseases is necessary for doctors of various specialties, since there is often a relationship between dental diseases and diseases of other organs and systems of the body.

However, Mustafaev M.Sh. et al. [33] carried out a comprehensive assessment of risk factors for dental diseases, studied the social and hygienic characteristics and dental activity of persons of military age in the Kabardino-Balkarian Republic of the Russian Federation on the basis of questionnaire analysis data, as well as the opinion of recruits about the quality of work of medical dental institutions. The study showed that insufficient sanitary literacy, insufficient attention to one's dental health, lack of motivation for the prevention of dental diseases and oral hygiene are observed in most young men of military age.

Orudzhev A.V. [41] conducted studies to determine the effectiveness of the use of apipreparations in the complex treatment of inflammatory periodontal diseases. For the experiment, 48 rabbits weighing 2.5-3.0 kg were selected. The average limits of the parameters and at the same time the analysis of the ratios of both groups with the conditionally control group showed that, although with the classical method (chlorhexidine) of treatment, in comparison with "Tridonium", inflammatory signs disappeared faster, in the process of restoring cellular structures during treatment with the traditional method, fibrosis was determined. collagen proliferation, which in turn means the formation of coarse fibrous scar tissue. Appipation "Tridonium" had the same effect on the pathological focus in the periodontal tissues as the classical method of treatment, but to a slightly lesser extent, being the cause of collagen proliferation, and differed from traditional drugs by a slow anti-inflammatory effect, confirmed by statistical data.

The purpose of the study Glazunova O.A. [8] evaluated the complex for the prevention of dental diseases in miners developed by him. In an experiment on animals, the complex contributed to the normalization of biochemical parameters in the oral fluid, blood serum and bone tissues of animals. In miners, it led to an improvement in the dental status, a decrease in the range of fluctuations in the pH of the oral fluid, and normalized the charge state of the cells of the buccal epithelium. The developed scheme for the use of a therapeutic and prophylactic complex, including the adaptogen "Biotrit C", the membrane stabilizer "Letsetin D3", the complex of vitamins and microelements "Alfavit", the elixir "Lyzodent", remineralizing and anti-inflammatory toothpastes, made it possible to increase the effectiveness of dental treatment and reduce relapses.

The authors have developed regulations for the dental care of workers with hazardous working conditions in departmental sanatoriums and in preparation for sanatorium treatment. To assess the dental status and the need for various types of dental treatment, a survey was conducted of 402 male workers with hazardous working conditions who are being treated in a sanatorium. Based on the results of the survey, the need for workers with hazardous working conditions in dental treatment per employee was calculated. The performed calculations substantiated the development of the algorithm "Regulations for the provision of dental care at the sanatorium-resort stage of the rehabilitation of workers with hazardous working conditions" [36,37].

Yusupov Z. Ya. et al. [53] believe that programs for the prevention of dental pathology should be based on the identification of risk determinants that form a pathogenic situation in the oral cavity and the compilation of a differentiated set of preventive measures. The dental status of workers at industrial production enterprises is characterized by negligence in observing individual oral hygiene, low sanitary culture and lack of motivation for the

prevention of dental diseases and oral hygiene. The authors show that sanitary and educational work should be carried out among the workers of industrial enterprises, the introduction of educational programs on individual and professional oral hygiene. The study of the results of many studies indicates the need to improve dental care for workers in industrial and manufacturing enterprises.

The author, as a result of his research, introduced the "Program for individualized prevention of major dental diseases among workers in copper metallurgy" developed by him, which contributed to improved hygiene - a decrease in the level of OHI-S by 52.0%), a decrease in the degree of inflammation of periodontal tissues (reduction of the PBI index by 58.0%), normalization of the acid-base state, osmolality of the oral fluid, decrease in the concentration of metals (Cu2+ ions) in the oral fluid [31].

The authors considered the issues of providing dental care to workers in hazardous industries and with especially dangerous working conditions. They believe that dental care and dental education in a comprehensive program for the prevention of dental diseases for workers exposed to harmful production factors and with especially dangerous working conditions should include primary, secondary and tertiary prevention, in addition, general preventive measures - plant-wide and general shop. individual activities, depending on age and length of service. Due to the high prevalence of dental caries among workers due to occupational risk factors, the main method of organizing dental care for such workers should be monitoring and medical examination. The basis of monitoring and clinical examination should be the organization of planned sanitation of the oral cavity of workers, with the wide development of the above preventive measures [13,49].

Berezin V.A. et al. [5] presented a retrospective review of the scientific literature, indicating the need to organize dispensary dental care for people working in industrial complexes. It has been proved that timely dental care for workers and employees of enterprises is an important condition and one of the leading methods for the prevention of major dental diseases. The authors noted that prevention programs should be based on the identification of risk factors that influence the formation of a pathogenic situation in the oral cavity, and in the preparation of an individual complex of therapeutic and preventive measures. Depending on the presence of risk factors, persons in contact with them are recommended to carry out general therapeutic and preventive measures or prescribe means and methods that mitigate their impact, as a result of which a predisposition to the development of various nosological forms of major dental diseases is formed. The study of the results of many studies confirms the effectiveness of the use of therapeutic and prophylactic complexes, which can significantly improve the dental status of enterprise workers.

3. Conclusions

Thus, the analysis of scientific sources of foreign and domestic researchers in recent years has shown that there are many factors that negatively affect the body of workers at the workplace of industrial enterprises, which affect the body in different ways. It is shown that the adverse effect on the oral cavity, along with other organs and tissues, is more pronounced, with an increase in the number of dental diseases. Also important are preventive measures to reduce dental diseases, protect the health of workers, and maintain their productivity at a high level. There are enough scientific works on the development and implementation of preventive measures based on the technological process in various manufacturing enterprises. However, there are few studies on the pathogenetic aspects of periodontitis, the chemical mechanism of action of chemical compounds used in production, pathogens and substitutions of chemical compounds in the formation and development of dental diseases.

At the moment, the action of these chemical compounds, their effects and long-term consequences for workers have not been studied. Therefore, it is important to study the technological processes of chemical enterprises using chemical compounds, the working conditions associated with them, the hygienic assessment of workplaces, the incidence of dental diseases among workers, depending on age and length of service at the enterprise.

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