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## THE INFLUENCE OF ENVIRONMENTAL FACTORS AND WORKING CONDITIONS ON THE DENTAL MORBIDITY OF THE POPULATION: A LITERATURE REVIEW

*The aim of the given article is to present an overview of the researches dedicated to the study of the influence of environmental factors and working conditions on the dental morbidity of the population. Results. In Ukraine, since the late 80s of the twentieth century, there has been an increased interest in studying the impact of environmental factors and geophysical factors on the state of dental morbidity in the population, which is primarily due to objective reasons. Thus, a large number of studies over the past decades have been devoted to the effect of radiation pollution on the development of dental diseases due to the Chernobyl tragedy. Their results prove that the number of patients with gingivitis and periodontitis is significantly higher among people living in areas contaminated with radionuclides in relation to people living in clean areas of these regions. Studies of the influence of environmental factors on human health are not limited to the study of the consequences of environmental disasters. The labor of workers in certain industries is associated with especially hazardous working conditions, characterized by the complex effect of harmful production factors of various nature and intensity. Particularly hazardous working conditions under the influence of radiation and chemical production factors cause a more pronounced intensity of dental diseases, first of all, diseases of the periodontal and oral mucosa. Conclusion. The conducted overview proves the need to identify dental diseases in workers of different professional groups, as well as the development and implementation of appropriate therapeutic and prophylactic measures. It is also desirable to impart oral health education to the workers, to inform them of the ill effects of their working conditions and teach them some remedial measures of the oral cavity. Key words: dental morbidity, environmental factors, working conditions.*

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## ВПЛИВ ФАКТОРІВ НАВКОЛИШНЬОГО СЕРЕДОВИЩА І УМОВ РОБОТИ НА СТОМАТОЛОГІЧНУ ЗАХВОРЮВАНІСТЬ НАСЕЛЕННЯ: ОГЛЯД ЛІТЕРАТУРИ

*Метою статті є огляд досліджень, присвячених вивченню впливу факторів зовнішнього середовища*

*та умов праці на стоматологічну захворюваність населення. Результати. В Україні, починаючи з кінця 80-х років ХХ століття, спостерігається підвищений інтерес до вивчення впливу факторів зовнішнього середовища та геофізичних факторів на стан стоматологічної захворюваності серед населення країни, що зумовлене насамперед об'єктивними причинами. Внаслідок цього за останні десятиліття велика кількість досліджень була присвячена впливу радіаційного забруднення на розвиток стоматологічних захворювань після Чорнобильської трагедії. Результати цих досліджень доводять, що кількість хворих на гінгівіт та пародонтоз значно вища серед людей, які проживають у районах, забруднених радіонуклідами, у порівнянні з людьми, які живуть у чистих районах регіонів країни. Дослідження впливу факторів навколишнього середовища на здоров'я людини не обмежуються вивченням наслідків екологічних катастроф. Праця робітників певних галузей пов'язана з особливо шкідливими умовами, що характеризуються комплексною дією шкідливих виробничих факторів різного характеру та інтенсивності. Особливо шкідливі умови праці під впливом різних радіаційних та хімічних виробничих факторів зумовлюють більш виражену інтенсивність зубних захворювань, насамперед захворювань слизової оболонки пародонту та ротової порожнини. Висновок. Проведений огляд доводить необхідність виявлення стоматологічних захворювань у працівників різних професійних груп, а також розробку та впровадження відповідних терапевтичних та профілактичних заходів. Бажано також надавати працівникам інформацію з питань захворювань ротової порожнини, повідомляти їх про шкідливий вплив умов праці та навчати деяких заходів із відновлення нормального стану ротової порожнини.*

*Ключові слова: стоматологічна захворюваність, фактори зовнішнього середовища, умови праці.*

**Introduction.** The increase in dental morbidity, which has been noted in recent years, has led to the emergence of a number of socio-economic and medical problems not only in Ukraine, but also in other countries of the world. We can agree or disagree with the authors studying the etiological factors leading to the occurrence of diseases of the tissues of the oral cavity, however, the modern period associated with environmental pollution requires a detailed study of the influence of harmful environmental factors on their development, thus underlining the relevance of the present article. One of the pressing problems that have become a growing threat in recent decades is the dependence of human health, including dental diseases, on the degree of environmental pollution, the importance of working and living conditions [1; 2; 3]. Majority of people employed in various industries are exposed to hazardous environment. This exposure deteriorates the general and oral health of people, working in industries for long hours. Every occupation is associated with one or other ill

effects on health. Studies have shown the association between occupational exposure and greater incidence of oral diseases [4].

**Aim.** The given article is dedicated to the overview of the researches dedicated to the study of the influence of environmental factors and working conditions on the dental morbidity of the population.

**Results.** At present, the prevention of any disease, including dental disease, should be carried out, first of all, taking into account geographic and ecological positions. The conditions of life on the planet are changing radically and have a strong impact on human health. One of the conditions for the emergence and development of dental diseases is a change in the quality of the environment and its effect on the human body, which is not always able to adapt to changes and the effects of the environment [5; 6]. Various factors have impact on a modern person: social, economic, industrial, urbanization, information load and increased migration, mobility of the population. From the point of view of medicine, the impact of environmental factors on the body can have various harmful consequences. As a result of the intensive use of natural resources and the growth of anthropogenic pressure on the environment, a critical ecological situation has recently developed in Ukraine, which affects human health [7; 8].

In Ukraine, since the late 80s of the twentieth century, there has been an increased interest in studying the impact of environmental factors and geophysical factors on the state of dental morbidity in the population of Ukraine, which is primarily due to objective reasons. Thus, a large number of studies over the past decades have been devoted to the effect of radiation pollution on the development of dental diseases due to the Chernobyl tragedy [9; 10]. The authors of these studies come, in particular, to such conclusions that in conditions of an increased radiation background, there is a tendency to an increase in the incidence of periodontal tissues due to a decrease in the general resistance of the organism [9]. Among the child population of Ukraine living in contaminated areas, there is also a high level of caries damage [10]. In persons exposed to ionized radiation, there is 100% damage to the periodontal tissues by generalized periodontitis, which is accompanied in most cases by the development of symptomatic catarrhal gingivitis [11]. The number of patients with gingivitis and periodontitis is significantly higher among people living in areas contaminated with radionuclides after the accident at the Chernobyl nuclear power station in relation to people living in clean areas of these regions [12].

It should be noted that studies of the influence of environmental factors on human health are not limited to the study of the consequences of environmental disasters. The development of the world and domestic economies determines the development of the industrial complex. The labor of workers in certain industries is associated with especially hazardous working conditions, characterized by the complex effect of harmful production factors of various nature and intensity. Particularly hazardous working conditions under the influence of radiation and chemical production factors cause a more pronounced intensity of dental diseases, first of all, diseases of the periodontal and oral mucosa [13].

In modern medicine, great attention is also paid to the impact of industrial production (coal, metallurgical, chemical, etc.) and the conditions of their activities on the health of workers, as well as the population living in the immediate vicinity of various industrial enterprises. Among such works there is the study of the incidence of dental caries in children with intoxication with salts of heavy metals living in regions with intensive industrial production; study of caries lesions in children in an industrial region; consideration of the influence of heavy metals on the dental status of children living in the ecologically unfavorable zones [14; 15].

As for the employees of such enterprises, in modern dentistry there is a tendency to increase interest in the study of occupational morbidity in this population group, since 2000 in Ukraine, as in other countries, there has been an intensive increase in the number of various occupational diseases [16]. For example, some researchers have found that people employed in lead production experience significant changes in their dental status: the prevalence and intensity of dental caries increases, diseases of the oral mucosa occur, gingivitis is noted, a low level of hygiene is observed, the index of gingivitis increases. In the organs, tissues of the oral cavity, qualitative and quantitative changes occur: the rate of secretion decreases, the pH of saliva shifts to the acidic side, the viscosity and the amount of sediment of the oral fluid increase; the threshold of perception of tactile, pain sensitivity decreases and the level of mobilization of temperature receptors of the gingival mucosa changes, the taste perception of the tongue changes. The chewing efficiency is significantly reduced and the optical density of the jaw bones is increased [17].

The study of the state of the oral cavity of workers in the coal mining industry [18], the dental morbidity of workers in the ammonia production [19], the incidence of caries and generalized periodontitis

in sailors [20], diseases of the oral mucosa in miners [21] are relevant today. The authors of these studies agree that human activity in difficult industrial conditions inevitably leads to the development of occupational diseases [19; 18]. The influence of chemical compounds on the human body and its tissues can manifest itself at the submolecular, molecular and cellular levels, leading to a change in metabolic processes in the tissues of the oral cavity and the body as a whole. Thus, researchers have proven the negative impact of iron ore dust, vibration, noise, temperature fluctuations on the state of various tissues of the dentition. These working conditions are considered as the main etiological factor in the development of a disease such as lichen planus [21]. In addition, it is noted that miners have a wide range of diseases of the oral mucosa and periodontal tissues. The structure, prevalence and severity of these diseases is in direct proportion to the length of service in harmful conditions [22].

The production environment of an ammonia plant also contributes to the development of dental morbidity, since the content of chemicals in the air of industrial premises, especially in workshops where finished products are stored, is several times higher than the maximum permissible standards [19]. Thus, as the researchers note, the special working conditions, together with the peculiarities of the chemical composition of the air, negatively affect the health and dental status of industrial workers [23].

Traditionally, in Odesa region, marine medicine has reached the greatest development as a branch of medical science, which studies the theory and practice of health protection in water transport. It investigates the working and living conditions of seafarers, and also provides a scientific basis for preventive measures to combat general and occupational diseases [24]. It has been proved that harmful chemicals present in the air of ship premises have a negative impact. The main sources of harmful gases, aerosols and vapors entering the ship's habitable spaces are exhaust gases, products of incomplete combustion of fuel and oils from engines and boilers. Typical is the excess of the norm of paint and varnish compositions, especially when carrying out paintwork on ships in closed and confined spaces. During the transportation of bulk cargo (grain, coal, ore, fertilizers and other mineral raw materials), a significant dust content of the air was revealed, especially on the open decks of bulk carriers, exceeding the maximum permissible norms by 10-100 times [25]. Rock dust is one of the main harmful factors when working with bulk

cargo [16]. It should be noted that in the structure of occupational diseases among workers associated with the extraction or transportation of bulk cargo in different countries, diseases of dust etiology occupy a leading place. First of all, the long-term influence of industrial dust leads to the development of dusty pathology of the lungs, since the respiratory organs are very sensitive to dust load [26]. Industrial dust is called the smallest particles of solid matter formed during the production process, which, entering the air, are suspended in it for a more or less long time. As the researchers note, when exposed to coal dust, dystrophic processes of varying severity develop in the upper respiratory tract. There is also a chronic pathology of the upper respiratory tract. Thus, the majority of workers exposed to coal dust suffer from pneumoconiosis, a dust-borne disease of the lungs [27]. In addition, it has been proved that iron ore dust containing silicon dioxide has a negative effect on the state of the oral mucosa and periodontal tissues. This leads to the development and spread of dental diseases such as gingivitis, caries, dental plaque, as well as to the weakening of the hard tissues of the teeth and their abrasion. Thus, iron ore dust has a great influence on the prevalence, intensity, frequency and nature of dental pathology [28].

**Conclusions.** The above facts prove the need to identify dental diseases in workers of different professional groups, as well as the development and implementation of appropriate therapeutic and prophylactic measures. It is also desirable to impart oral health education to the workers, to inform them of the ill effects of their working conditions and teach them some remedial measures.

#### **Bibliography:**

1. Авалиани С.А., Андрианова М.М. Окружающая среда. Оценка риска для здоровья (мировой опыт). Москва : Владос-Пресс, 1999. 158 с.
2. Анненков П.Р. Гигиеническая оценка среды обитания и здоровья населения крупного промышленного округа мегаполиса: автореф. дис. на соискание науч. степени канд. мед. наук. Москва, 1999. 24 с.
3. Борчалинская К.К., Смирнова Т.А., Козичева Т.А. Стоматологическая заболеваемость детского населения и показатели загрязнения окружающей среды. *Dental Forum*. 2009. № 2 (30). С. 22–27.
4. Sudhanshu S, Pankaj A, Sorabh J, Nidhi S. Dental Diseases of Acid Factory Workers Globally-Narrative Review Article. *Iran J Public Health*. 2014. 43(1). P. 1–5.
5. Каюкова В.Д., Дычко Е.Н. Влияние настоя мяты перечной на процессы слюноотделения у детей. *Актуальные вопросы медицины и биологии: Тезисы докладов*. Днепропетровск, 1992. С. 96–97.

6. Фитоэстрогены (биохимия, фармакология, применение в медицине) / Левицкий А.П., Макаренко О.А., Сукманский О.И. Одесса : Морьяк, 2002. 95 с.
7. Горова А.І., Колесник В.Є., Павличенко А.В. Моделювання впливу забрудненості довкілля на здоров'я людини. *Довкілля та здоров'я*. 2006. № 4. С. 3–7.
8. Присяжнюк З.Р., Доценко В.М. et al. Экологическая гигиеническая оценка окружающей среды и здоровье населения различных регионов Украины. *Охрана здоровья і довкілля*: Матер. наук.-практ. конф. Львів, 1996. С. 56–57.
9. Косарева Л.И. Метод клинической оценки структурно-функциональной резистентности эмали и его применение в системе диспансеризации школьников : автореф. дис. ...к.м.н. Київ, 1983. 24с.
10. Хельвиг Э., Климек Й., Аттин Т. Терапевтическая стоматология. Львов: ГалДент, 1999. 409 с.
11. Петрова Н.Г. О факторах, неблагоприятно влияющих на здоровье населения. *Здравоохранение*. 1985. № 7. С. 12–14.
12. Косенко В.М. Застосування стоматологічної композиції СК-М у комплексному лікуванні захворювань пародонту у мешканців районів, забруднених внаслідок аварії на Чорнобильській АЕС : Автореф. дис. ... канд. мед. наук. Львів, 1997. 16 с.
13. Огай Ю.А., Алексеева Л.М. et al. Полифенольные биологически активные компоненты пищевого концентрата «Эноант». *Проблемы, достижения и перспективы развития медико-биологических наук и практического здравоохранения*. 2005. Т. 141, часть 1. С. 14–20.
14. Вербицька А.В. Розробка комплексу профілактичних заходів карієсу зубів при інтоксикації солями важких металів: автореф. дис. на здобуття наук. ступеня канд. мед. наук : спец. 14.01.22 «Стоматологія». Київ, 2007. 20 с.
15. Казакова Р.В., Кольцова Н.І., Білищук М.В. Співвідношення та вплив чинників довкілля на розвиток і перебіг стоматологічних захворювань у дітей. *Новини стоматології*. 1998. № 3. С. 48–50.
16. Глазунов О.А., Глазунова С.О. Влияние железорудной пыли на состояние организма и стоматологический статус работников горной промышленности (обзор литературы). *Вісник стоматології*. 2008. № 3. С. 97–102.
17. Ермолаев Ю.Г., Струев И.В. et al. Проблема стоматологической реабилитации лиц с хронической интоксикацией свинцом на производстве. *Естествознание и гуманизм*. 2007. Т. 4, № 3. С. 44.
18. Строченко Е.А., Скиба В.Я. Состояние гигиены полости рта у работников Ильичевского морского торгового порта. *Матеріали конференції «Наукові та практичні аспекти індивідуальної та професійної гігієни порожнини рота у дітей та дорослих»* 14-15 квітня 2009 року. Одеса : Абрикос, 2009. С. 108–109.
19. Бабов Є.Д., Михайленко Є.Д. Стоматологічна захворюваність працівників аміачного виробництва. *Вісник стоматології*. 2008. № 1. С. 21–22.
20. Рабинович И.М., Банченко Г.В. et al. Роль микрофлоры в патологии слизистой рта. *Стоматология*. 2002. № 5. С. 48–50.
21. Глазунов О.А. Эпидемиология патологических изменений слизистой оболочки полости рта у горнорабочих. *Вісник стоматології*. 2008. № 1. С. 3–4.
22. Груздева А.А. Морфологические изменения слизистой оболочки рта у рабочих железорудных шахт Кривого Рога. *Таврический медико-биологический вестник*. 1998. № 3-4. С. 34–36.
23. Огай Ю.А., Валуйко Г.Г. et al. Пищевой концентрат полифенолов винограда «Эноант», достижения и перспективы производства и применения в питании. *Материалы международной научно-практической конференции «Биологически активные природные соединения винограда: перспективы производства и применения в медицине и питании»*. Симферополь, 2001. С. 60–62.
24. Лисобакт – оптимальный выбор в терапии эрозивно-язвенных поражений слизистой полости рта. URL: <http://www.100matolog.com>.
25. Войтенко А.М., Шафран Л.М. Гигиена обитаемости морских судов. Київ : Здоров'я, 1989. 136 с.
26. Шаповалова Г.І. Комплексна профілактика захворювань твердих тканин зубів у дітей, які підпали під дію радіації в зв'язку з аварією на ЧАЕС: Автореф. дис. ... канд. мед. наук. Київ, 2000. 19 с.
27. Горская Н.И. Проблемы профзаболеваний в угольной отрасли. *Гигиена труда и профзаболеваний*. 1992. №7. С. 9–12.
28. Effects of lipopolysaccharide and inflammatory cytokines of interleukin-6 production by healthy human gingival fibroblasts / L.W. Kent, F. Rahemtulla, R.D.Sr. Hockett et al. *Infect. Immun.* 1998. Vol. 66., №2. P. 608–614.

## References:

1. Avaliani, S.A., Andrianova, M.M. (1999). Okruzhajushhaja sreda. Ocenka riska dlja zdorov'ja (mirovoj opyt) [Environment. Health risk assessment (world experience)]. Moscow: Vldos-Press [In Russian].
2. Annenkov, P.R. (1999). Gigienicheskaja ocenka sredy obitaniya i zdorov'ja naselenija krupnogo promyshlennogo okruga megapolisa [Hygienic assessment of the habitat and health of the population of a large industrial district of a megapolis]: abstract of Ph.D. dis... Moscow [In Russian].
3. Borchalinskaya, K.K., Smirnova, T.A., Kozicheva, T.A. (2009). Stomatologicheskaja zaboлеваemost' detskogo naselenija i pokazateli zagrijaznenija okruzhajushhej sredy [Dental morbidity in the child population and indicators of environmental pollution]. *Dental Forum*. No. 2 (30), 22-27. [In Russian].
4. Sudhanshu, S., Pankaj, A., Sorabh, J., & Nidhi, S. (2014). Dental Diseases of Acid Factory Workers Globally-

Narrative Review Article. *Iranian journal of public health*, 43(1), 1–5.

5. Kayukova, V.D., Dychko, E.N. (1992). Vliyanie nastoja mjaty perechnoj na processy sljuootdelenija u detej [Influence of peppermint infusion on salivation processes in children]. *Topical issues of medicine and biology: Abstracts*. Dnepropetrovsk, 96-97. [In Russian].

6. Fitojestrogeny (biohimija, farmakologija, primenenie v medicine) (2002). [Phytoestrogens (biochemistry, pharmacology, use in medicine)] / Levitsky AP, Makarenko OA, Sukmanskij O.I. Odessa: Moryak. [In Russian].

7. Gorova, A.I., Kolesnik, V.Y., Pavlichenko, A.V. (2006). Modeljuvannja vplivu zabrudnenosti dovkillja na zdorov'ja ljudini [The model of the inflow of the hardships of the environment on the health of the people]. *Zdorove dovkillja*. No. 4, 3-7. [In Ukrainian].

8. Prisyazhnyuk, Z.R., Dotsenko, V.M. et al. (1996). Ekologo-gigienicheskaja ocenka okruzhajushhej sredy i zdorov'e naselenija razlichnyh regionov Ukrainy [Ecological and hygienic assessment of the environment and health of the population of various regions of Ukraine. Health and wellness guard]: Mater. nauk.-practical. conf. Lvov, 56-57. [In Russian].

9. Kosareva, L.I. (1983). Metod klinicheskoy ocenki strukturno-funkcional'noj rezistentnosti jemali i ego primenenie v sisteme dispanserizacii shkol'nikov [The method of clinical assessment of the structural and functional resistance of enamel and its application in the system of medical examination of schoolchildren]: Author's abstract. Kiev [In Russian].

10. Helvig, E., Klimek, J., Attin, T. (1999). Terapevticheskaja stomatologija [Therapeutic dentistry]. Lvov: GalDent [In Russian].

11. Petrova, N.G. (1985). O faktorah, neblagoprijatno vlijajushhij na zdorov'e naselenija [On the factors that adversely affect the health of the population]. *Healthcare*. No. 7, 12-14 [In Russian].

12. Kosenko, V.M. (1997). Zastosuvannja stomatologichnoi kompozicii SK-M u kompleksnomu likuvanni zahvorjuvan' parodontu u meshkanciv rajoniv, zabrudnenih vnaslidok avarii na Chornobil's'kij AES [Usage of dental composition SK-M in the complex treatment of periodontal disease in Bagkans districts that have been involved in accidents at the Chornobil AES]: Author's abstract. dis. Lviv [In Ukrainian].

13. Ogay, Yu.A., Alekseeva, L.M. et al. (2005). Polifenol'nye biologicheski aktivnye komponenty pishhevoogo koncentrata «Enoant» [Polyphenolic biologically active components of the food concentrate "Enoant"] *Problems, achievements and prospects for the development of biomedical sciences and practical health care*. Vol. 141, part 1, 14-20 [In Russian].

14. Verbitska, A.V. (2007). Rozrobka kompleksu profilaktichnih zahodiv kariesu zubiv pri intoksikacii soljami vazhkih metaliv [Development of a complex

of prophylactic entry into the tooth cavity in case of intoxication with salts of important metals]: abstract of Ph.D. dis.: spec. 01/14/22 "Dentistry". Kyiv [In Ukrainian].

15. Kazakova, R.V., Koltsova, N.I., Bilishchuk, M.V. (1998). Spivvidnoshennja ta vpliv chinnikov dovkillja na rozvitok i perebig stomatologichnih zahvorjuvan' u ditej [Correspondence and inflow of officials of the donation for the development and surplus of dental illnesses in children]. *Dentistry news*. No. 3, 48-50 [In Ukrainian].

16. Glazunov, O.A., Glazunova, S.O. (2008). Vliyanie zhelezorudnoj pyli na sostojanie organizma i stomatologicheskij status rabotnikov gornoj promyshlennosti (obzor literatury) [The influence of iron ore dust on the state of the body and the dental status of workers in the mining industry (literature review)]. *Dentistry bulletin*. No. 3, 97-102 [In Russian].

17. Ermolaev, Yu.G., Struev, I.V. et al. (2007). Problema stomatologicheskoy reabilitacii lic s hronicheskoy intoksikaciej svincom na proizvodstve [The problem of dental rehabilitation of persons with chronic lead intoxication at work]. *Natural science and humanism*. Vol. 4, No. 3, 44 [In Russian].

18. Strochenko, E.A., Skiba, V.Ya. (2009). Sostojanie gigieny polosti rta u rabotnikov Il'ichevskogo morskogo tovgovogo porta [The state of oral hygiene among workers of the Illichivsk Commercial Sea Port]. *Materials of the conference "Science and practical aspects of individual and professional services for empty companies among children and adults" 14-15 April 2009*. Odessa: Apricot, 108-109 [In Russian].

19. Babov, Y.D., Mikhailenko, Y.D. (2008). Stomatologichna zahvorjuvanist' pracivnikiv amiachnogo virobництва [Dentistry ailment of professional doctors of the American medical practice]. *Dentistry bulletin*. No. 1, 21-22 [In Ukrainian].

20. Rabinovich, I.M., Banchenko, G.V. et al. (2002). Rol' mikroflory v patologii slizistoj rta [The role of microflora in the pathology of the oral mucosa]. *Dentistry*. No. 5, 48-50 [In Russian].

21. Glazunov, O.A. (2008). Glazunov O.A. Jepidemiologija patologicheskijh izmenenij slizistoj obolochki polosti rta u gornorabochih [Epidemiology of pathological changes in the oral mucosa in miners]. *Dentistry bulletin*. No. 1, 3-4 [In Russian].

22. Gruzdeva, A.A. (1998). Morfologicheskie izmenenija slizistoj obolochki rta u rabochih zhelezorudnyh shaht Krivogo Roga [Morphological changes in the oral mucosa in the working iron ore mines of Krivoy Rog]. *Tavrishesky medico-biological bulletin*. No. 3-4, 34-36 [In Russian].

23. Ogay, Yu.A., Valuiko, G.G. et al. (2001). Pishhevoj koncentrat polifenolov vinograda «Jenoant», dostizhenija i perspektivy proizvodstva i primenenija v pitanii [Food concentrate of grape polyphenols "Enoant", achievements and prospects of production and use in nutrition]. *Materials of the international scientific-practical*

conference “*Biologically active natural compounds of grapes: prospects for production and use in medicine and nutrition*”. Simferopol, 60-62 [In Russian].

24. Lisobakt – optimal'nyj vybor v terapii jerozivno-jazvennyh porazhenij slizistoj polosti rta [Lisobakt is the optimal choice in the treatment of erosive and ulcerative lesions of the oral mucosa]. URL: <http://www.100matolog.com> [In Russian].

25. Voitenko, A.M., Shafran, L.M. (1989). *Gigiena obitaemosti morskich sudov* [Hygiene of habitability of sea vessels]. Kyiv: Zdorov'ya [In Russian].

26. Shapovalova, G.I. (2000). *Kompleksna profilaktika zahvorjuvan' tverdih tkanin zubiv u ditej, jaki pidpali pid*

*diju radiacii v zv'jazku z avarieju na ChAES* [Complex prophylaxis of the incidence of hard tissues of teeth in children who received a radio call in response to an emergency at the ChAES]: Author's abstract. dis. Kyiv [In Ukrainian].

27. Gorskaya, N.I. (1992). *Problemy profzabolevanij v ugol'noj otrasli* [Problems of occupational diseases in the coal industry. Occupational hygiene and occupational diseases]. No. 7, 9-12 [In Russian].

28. Effects of lipopolysaccharide and inflammatory cytokines of interleukin-6 production by healthy human gingival fibroblasts (1998) / L.W. Kent, F. Rahemtulla, R.D.Sr. Hockett et al. *Infect. Immun.* Vol. 66., no. 2, 608-614.