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Dear colleagues!

On my own behalf and on behalf of Altai State Medical University, I welcome you to events dedicated to the 30th anniversary of the Faculty of Dentistry.

If you turn to history, the foundation of the faculty became necessary due to the lack of specialists with higher dental education in the region and nearby regions of Western Siberia.

At that time, dental care was provided mainly by specialists with secondary medical education. Specialists with higher education came to Altai Krai as a result of distribution from neighboring regions.

Subsequently, the appearance of this faculty, as well as the involvement of young highly qualified specialists in teaching and therapeutic activities provided a powerful impetus for the development of dental services not only in the region, but also throughout Siberia.

In 1995, one of the landmark events for the Faculty of Dentistry took place: the first graduation in the number of 82 medical specialists.

In general, we trained more than one and a half thousand dentists for three decades.

Years passed, the potential of the faculty was steadily growing: the scientific field was regularly replenished with successful defenses of candidate's dissertations, which were made by teachers of the Faculty of Dentistry on the material of clinical bases.

In 2016, there was a new facet in the life of the faculty: it was from this year that students from far-abroad countries such as Syria, China, Mongolia, Iraq, Egypt, Nigeria, Morocco has been admitted. 122 students from far abroad and more than 600 students from Russia and neighboring countries study in the specialty of dentistry.

Beyond that, the faculty has been proud of dental dynasties in all years. And this year, a lot of children of our respected graduates were admitted: Anastasia Oreshaka, Andrei Ovcharenko, Stepan Tolmachev, Viktoriya Shmargun, Alina Baghdasaryan, Svetlana Serebryakova.

Since we mentioned students, there are a lot of talented, creative and sports persons at the faculty.

As in sports, the Institute is always moving forward to new goals and new victories, progressively developing, looking for ways to improve the quality of training of dentists, making a worthy contribution to the dynamic development of the Altai State Medical University.

And last 2020, by the decision of the Academic Council, the Faculty of Dentistry was transformed into the Institute of Dentistry.

It works in close connection with medical and preventive institutions of Altai Krai. The mutual interaction provides conditions for high-quality training of dentists. The dental service of Altai Krai is 95% staffed by graduates of the now Institute of Dentistry.

The future of dentistry of Altai Krai lies not only in the coordinated work of all departments of the Institute, but also in the interaction of educational and practical components of regional dentistry.

In conclusion, I would like to wish the Institute of Dentistry further successful and prosperous work.

Sincerely, I.I. Sheremetyeva, Acting Rector of ASMU, Professor, Doctor of Medical Sciences

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X-RAY ANALYSIS OF CRANIOMANDIBULAR AND CRANIOCERVICAL POSTURAL EQUILIBRIUM BASED ON THE PROTOCOL OF PROFESSOR M. ROCABADO

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This article presents the diagnosis of cranial patterns (craniocervical cephalometric analysis according to the method of Professor M. Rocabado), as well as the analysis of structures of temporomandibular joints with the help of cone beam computed tomography, allowing for a fuller amount of information for the preparation of a full-scale comprehensive treatment plan.

Keywords: X-ray analysis protocol, craniocervical cephalometric analysis of M. Rocabado, craniomandibular disorders, cranial patterns, temporomandibular joint.

With ever-increasing frequency, people apply to dental clinics with complaints about headaches and facial pain, sound phenomena in the temporomandibular joints (TMJ), muffled hearing, difficulty in the movement of the lower jaw. This is a contingent of patients who, in addition to the presence of a dental pathology, have neurological, psychosomatic, as well as postural disorders that require both complex diagnosis and interdisciplinary treatment. However, the analyses of cone beam computed tomography (CBCT) available to us are focused and do not allow to integrally evaluate the prevailing morphofunctional factor; therefore, despite the abundance of methods, improvements in approaches to interpretation of CBCT data are still required, which was the aim of developing a protocol involving the assessment of craniocervical zone structures. It includes: diagnosis of cranial patterns (craniocervical cephalometric analysis by M. Rocabado), evaluation of skeletal structures of TMJ.

Materials and methods

The literature review was conducted using the PubMed search engine, as well as the Scopus and Medline electronic databases up to September 2020. X-ray measurements were carried out in the InViVo 5 Anatomage program.

Results and discussion

I. Analysis of craniomandibular disorders (necessary in the planning of complex treatment together with a myofunctional therapist) and evaluation of respiratory tract volume to exclude obstructive apnea syndrome.

1. *Evaluation of the position of the hyoid bone (craniocervical cephalometric analysis by M. Rocabado) and tongue.*

The measurement is carried out as follows: it is necessary to draw a line from the anterior lower corner of the body of the third cervical vertebra to the lowest point of the mandibular symphysis Me (Menton), further a perpendicular is conducted from the most anterior upper point of the hyoid bone to the drawn line. Normally, the length of the perpendicular should be 5.0 ± 2.0 mm (Figure 1, 2).

2. Respiratory tract.

The Anatomage InVivo Dental program has a visual scale for estimating the extent of upper respiratory tract constriction (URT) at the naso- and oropharynx level based on the David Hatcher study. Normally, the cross-sectional area of the respiratory tract is 110–140 mm². The respiratory tract volume is calculated in this program from the anatomical point of the PNS to the epiglottis. Black, red and orange colors denote respiratory tract constriction (Figure 3) [1].

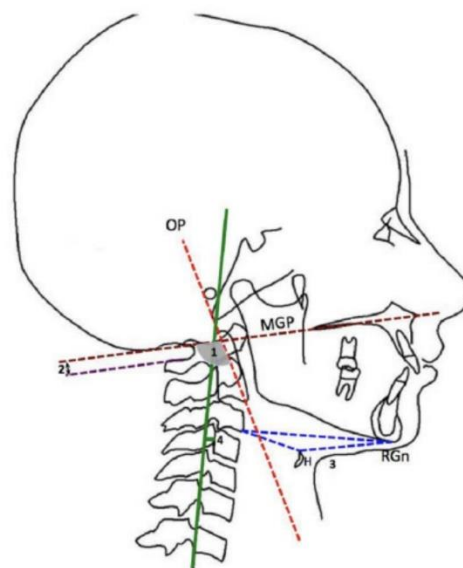


Figure 1. Hyoid Triangle by M. Rocabado.



Figure 2. Evaluation of the position of the hyoid bone to the base of the mandibular body (0.09 mm). InViVo 5 Anatomage program.

Normally, the tongue should occupy the entire

vault of the hard palate. If the space between the tongue and the hard palate is traced on CBCT, this indicates its incorrect position and function, which causes respiratory tract constriction at the level of the oropharynx [2].

In the case of lengthening the distance between the hyoid bone and the base of the lower jaw and constriction of the URT, as well as the incorrect position of the tongue in the oral cavity, an orthodontist can make an assumption that there is obstructive apnea syndrome in the patient and send for further instrumental examination to a somnologist to confirm the diagnosis – for polysomnography (PSG) [3].

3. *Evaluation of the position of cervical vertebrae (craniovertebral functional spaces by M. Rocabado).*

Normally, the distance between C0-C1 (occipital bone and first cervical vertebra) and C1-C2 (spinous processes of the first and second cervical vertebrae) is $6.5 \text{ mm} \pm 1-2.5 \text{ mm}$ (Figure 4) [4].

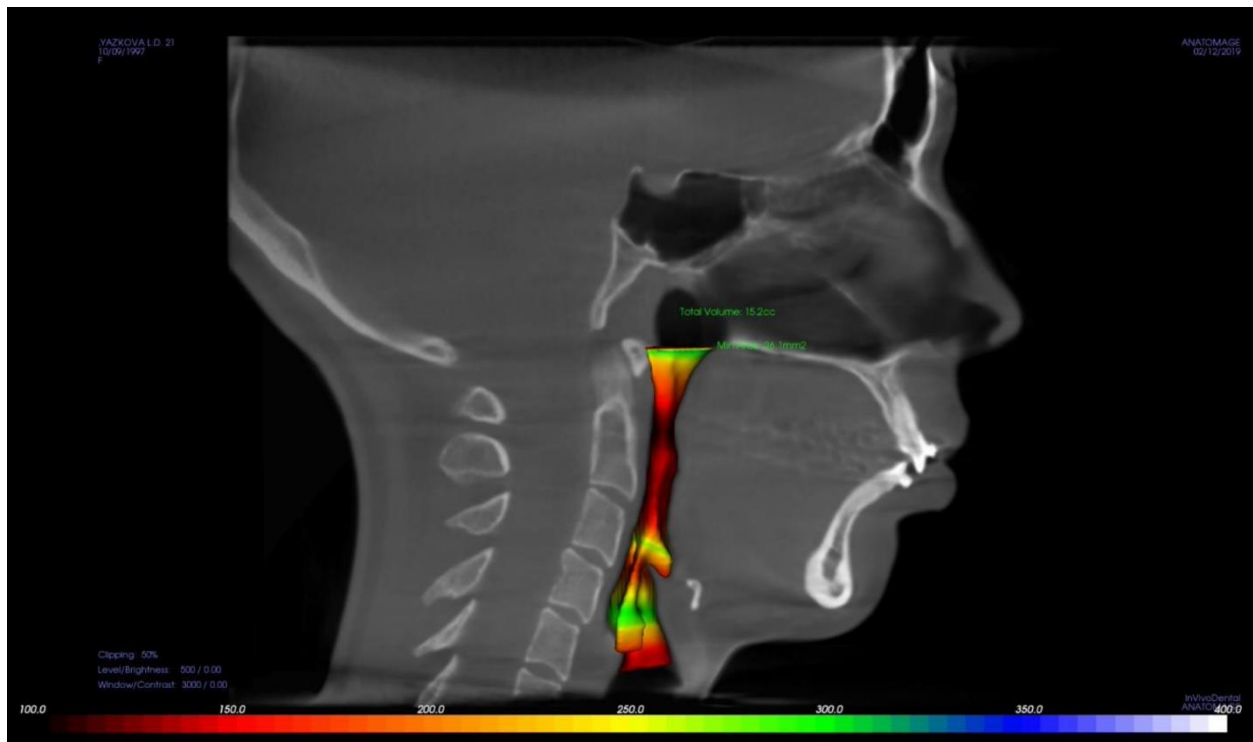


Figure 3. Respiratory tract constriction. The minimum cross-sectional area is 26.1 mm^2 (norm: $110-140 \text{ mm}^2$). InViVo 5 Anatomage program.

4. *Craniovertebral centric relation by M. Rocabado.*

CBCT also has the possibility of analyzing the rotations of the first and second cervical vertebrae. The measurement is carried out from the posterior tubercle of the first cervical vertebra to the tooth of the second cervical vertebra (the greater distance indicates the rotation of C1 in this direction) (Figure 5).

II. Evaluation of the position of the lower jaw heads in the temporomandibular joints (TMJ).

The position of the lower jaw heads in the articular cups can be evaluated approximately by CBCT: centric relation, mesial or distal displacement. This method is undoubtedly valuable for evaluating TMJ structures, but it is recommended to use magnetic resonance computed imaging (MRI) [5, 6] to assess intraarticular pathology.



Figure 4. Reduction of the distance between C0-C1 and C1-C2. InViVo 5 Anatomage program.

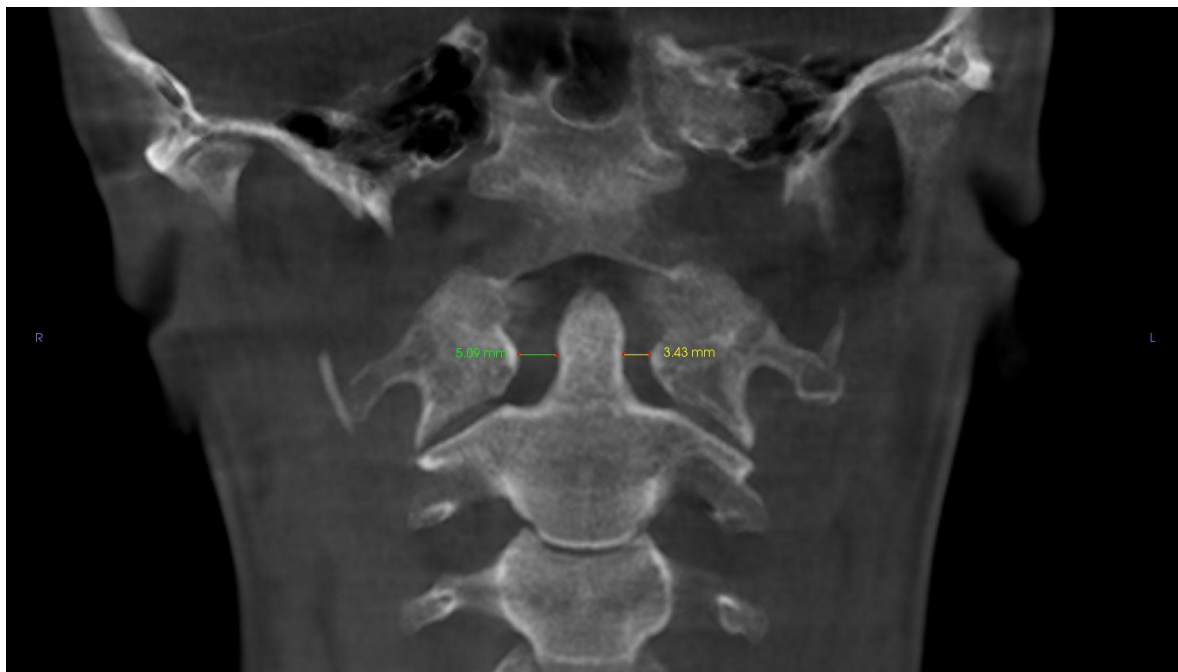


Figure 5. Rotation of the first cervical vertebra (C1) to the right, since the distance between C1 and tooth of C2 is greater on the right side – 5.09 mm; left – 3.43 mm. InViVo 5 Anatomage program.

In 2011, Ikeda K., Kawamura A. and Ikeda R., Japanese scientists, surveyed 22 people and obtained the following average values of joint space sizes: 1.3 ± 0.2 mm – anterior articular space, 2.5 ± 0.5 mm – upper articular space, and 2.1 ± 0.3 mm – posterior articular space [7]. Normally, in the transversal plane, the medial pole should be located as close to the wall of the articular cup as possible [8]. If the distance between the medial pole and the wall of the articular cup greatly differs between the two joints, this indicates a dislocation of the lower jaw in the transversal direction. CBCT is an excellent tool for analyzing the anatomical structure of articular heads (Figure 6) [9].

Conclusion

This protocol complements the classical analysis of CBCT, which allows obtaining the fuller amount of information when planning treatment for patients with craniomandibular dysfunction. In addition:

1. Comprehensive evaluation of the temporomandibular joints allows assessing the shape of the heads, the state of the bone, the size of the joint spaces in various segments.
2. Measurement of respiratory tract volume, assessment of the location of the hyoid bone and tongue, cervical vertebrae, screening examination of obstructive apnea give the opportunity to the

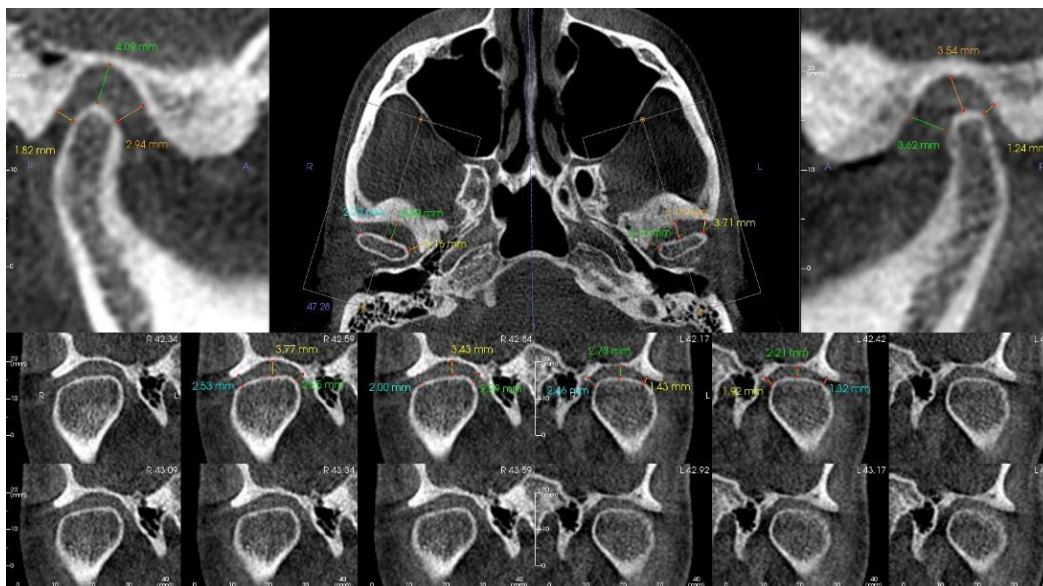


Figure 6. Landmarks for measuring the joint space [8].

dentist to more comprehensively approach diagnosis and treatment in order to improve the quality and expectancy of life of a person.

Clearly, this analysis requires refinement and is only an addition to the standard methods of cephalometric analysis and CBCT.

Conflict of interest. The authors declare no conflict of interest.

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DETERMINATION OF PSYCHOLOGICAL STATUS OF PATIENTS BY THE TYPE OF ATTITUDE TOWARDS THE DISEASE IN CONDITIONS OF PANDEMIC

Russian Medical Academy of Continuous Professional Education, Moscow

A.S. Stuzhuk, D.V. Sorokin, D.S. Abakarova, K.S. Adzhiev

The psychological state of a person is an important component in the development and treatment of any disease. In the context of a pandemic, this aspect becomes particularly important. In the article, the authors analyzed the results of remote survey of attitude towards the new coronavirus disease according to the method of TATD in order to determine the psychological status of patients of orthopedic departments in dental clinics, which revealed the need for psychological assistance to people of the age category 65+ years.

Keywords: *psychological status, coronavirus disease, COVID-19, method of determining the attitude towards the disease, TATD method.*

Since ancient times, it is known that the mental characteristics of a person affect the processes of the development of their disease, which ultimately affects the therapeutic effect of medicines on the body, their recovery. The placebo effect, homeopathy, somatogenic psychoses – this is not the whole list of concepts in medicine which are somehow related to the peculiarities of the patient's personality. The principle of Hippocrates "it is necessary to treat the patient, and not the disease" fully justifies psychotherapy of patients with somatic disorders, changing the attitude towards the disease, thereby improving condition of the patient, shortening the time of their recovery.

In the context of the COVID-19 pandemic, psychological health is most vulnerable, and the attitude of a person towards the spread of a new coronavirus infection, although unique, can be described through belonging of this attitude to a certain psychological type. Diagnosis of the type of attitude towards the disease (TATD) in the patient allows the treating physician to use the entire arsenal of methods of therapy of both the body and the "spirit".

The purpose of the study was to predict the effect of the spread of a new coronavirus infection on the psychological status of patients of the clinic of orthopedic dentistry.

Materials and methods

To achieve this purpose, 86 patients of orthopedic dentistry departments at clinical bases of the Department of Orthopedic and General Dentistry of the Russian Medical Academy of Continuous Professional Education were interviewed according to the TATD method.

The TATD questionnaire (authors: L.I. Vasserman, B.V. Iovlev, E.B. Karpova, A.Ya. Vuks, 2005, St. Petersburg Bekhterev Psychoneurological

Research Institute) helps diagnose the type of attitude towards the disease on the basis of information on the attitude of a person towards a number of life problems and situations that are potentially significant for them. The method involves studying the patient's attitude towards their disease; we have changed the questionnaire to some extent: firstly, the questionnaire was carried out in healthy respondents (without signs of COVID-19 infection at the time of diagnostics); secondly, we determined the patient's attitude towards a new coronavirus infection in particular; thirdly, the survey was conducted online using the Internet platform Testograf.ru or via telephone questionnaire.

We divided the interviewees into two age groups: under 65 (42 patients) and 65 or more (44). The TATD questionnaire includes 12 tables-sets of statements. Each set contains 10 to 16 proposed statements compiled from the clinical experience of a group of 60 highly qualified experts: clinical psychologists, psychotherapists, psychoneurologists, psychiatrists, and therapists. When working with the method, the patient is asked to choose two statements most relevant for them on each topic or an additional statement that neither is relevant. The time of filling the questionnaire is not limited, so it can be assumed that the remote form of the survey did not affect the result of the study.

Results and discussion

The analysis of the obtained psychological profiles showed that in the first group (up to 65 years) the ergopathic anosognosic type of attitude towards the disease was the most common (in 31%). This mixed type is characteristic of "diving into work", the desire to maintain professional status at all times, and the possibility of continuing active work. At the same time, people of this type

throw away thoughts about the disease, possible consequences. In this regard, they often refuse to be examined and comply with medical instructions.

Equally (19% each), unmixed ergopathic and anosognosic types were expressed in the first age group.

Only 2% of respondents revealed the harmonious, most favorable type of attitude towards the disease. Such patients take realistically the process of development of the disease, strive to actively cooperate with medical personnel.

A fairly high percentage (12%) of respondents have the anxious type that is characterized by continuous anxiety, overanxiousness about the adverse course of the disease, possible complications, inefficacy and even danger of treatment.

In the "young" age group of patients, hypochondriac (7%), neurasthenic (5%) and apathetic (2%) types of attitude towards the disease were also determined.

If in patients under 65 years more than 2/3 (74%) had the types of attitude towards the disease from the first unit, which includes harmonious, ergopathic and anosognosic types, in which mental and social adaptation is not significantly violated, in the second age group (65+ years), the personal characteristics of 77% of respondents can be attributed to the second unit of response to the disease. Such people are characterized by the intrapsychic orientation of attitude towards the disease, which causes violations of social adaptation.

The hypochondriac type of response was determined in 34% of respondents over 65 years of age. They are characterized by an excessive focus on subjective painful sensations, desire to constantly tell doctors and others about them, exaggeration of the real and search for non-existent symptoms, combination of desire to be treated and disbelief in success, search for reputable specialists.

The fifth part of the second age group showed the presence of the anxious melancholic type of attitude towards the disease. Unlike the hypochondriac type, this part of patients express interest in the results of tests and opinions of specialists rather than subjective sensations, they often change the doctor, listen to manifestations of the disease and complaints in others. The "melancholic" component of this mixed type is depression, a pessimistic view of treatment, superdependency with the disease.

Unmixed melancholic, apathetic, egocentric, and anosognosic types of response to the disease were identified in 14%, 9%, 5% and 18% of patients respectively.

The apathetic type is characterized by complete indifference to one's destiny, loss of interest in life,

lethargy and apathy in behavior. The situation is just the opposite with the egocentric type of attitude towards the disease. People of this type "accept" the disease, seek benefit due to the disease, expose their suffering and emotional stress, demand exceptional care for themselves. The latter type is included in the third unit with the interpsychic orientation of personal response, when the violations of social adaptation of the patient are most pronounced.

Conclusion

Despite a small sample, it can be concluded that older patients tolerate new living conditions worse, it is more difficult for them to adapt to self-isolation, they need help and moral support.

Conflict of interest. The authors declare no conflict of interest.

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RESPONSIBILITY OF SPECIALISTS FOR POOR QUALITY PROVISION OF DENTAL ORTHOPEDIC CARE TO THE POPULATION

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The article is devoted to the description of the modern situation associated with poor quality provision of dental orthopedic care to the population, which caused harm to the life and health of the patient. We analyzed the articles of the Criminal Code of the Russian Federation, according to which medical workers are currently prosecuted in case of commission of careless crime related to harm to the life and health of the patient. An analysis of sanctions of these articles was conducted. The possibility of positive preventive impact of sanctions of new articles of the Criminal Code is noted.

Keywords: dental orthopedic care to the population, professional crimes of medical workers, crimes associated with defect of medical care, professional dental activity, criminal law sanctions, criminal law sanction system.

Healthcare delivery always involves risks of varying degrees. Although the quality of dental services is increasing every year, the number of complaints of the poor work of dentists does not decrease. There are several reasons for this.

First, apart from risk, the provision of dental care to the population is directly related to the problem of professional mistakes. For example, according to the World Health Organization (hereinafter – WHO), 9% of medical errors occur, whereas in Russia, the number of detected defects far exceeds the WHO figure and amounts to 35% [1]. In addition, a large number of citizens' appeals to the courts and numerous publications in the media have shown the urgency of the problem.

Second, the provision of dental orthopedic care to the population, as a rule, refers to paid services as the program of state guarantees does not include prosthetics and preparation for prosthetics. At the same time, the constituent entities of the Russian Federation may establish regional benefits. Thus, in accordance with the Law of the City of Moscow dated 03.11.2004 No. 70 "On measures of social support for certain categories of residents of Moscow", free dentures production and repair are carried out for: veterans, people with disabilities, and participants of the Great Patriotic War; liquidators of the Chernobyl accident; soldiers-internationalists; war workers, etc.

This makes citizens choose if to use the services of public dental clinics or to contact private dental clinics. Today, the dental industry accounts for approximately 50% of the entire Russian market for paid medical services, being the most commercially oriented segment of the industry.

Third, the pursuit of profits, and sometimes with the aim of just surviving in the face of intense competition in the dental services market, objectively pushes private dental clinics to direct towards providing high-tech expensive services

without trained orthopedic doctors and the necessary equipment. Dental implants can serve as an example.

Thus, according to the Investigative Committee of the Russian Federation, the number of medical errors or other improper actions of medical workers has increased more than three times in the last six years [2]. Only 10% of criminal cases investigated for medical errors make it to court. In February 2020, the Minister of Health of the Russian Federation announced the complications that about 70 thousand people receive each year due to improper actions of doctors [3].

This work aims to investigate the factors of criminal liability of an orthopedic dentist for unqualified provision of medical services which led to the cause of significant harm to patient's health.

Materials and methods

As tools during this study, general scientific cognition methods were used: synthesis and system analysis, as well as comparative law, statistical, etc.

It should be noted that in science today there is no concept of professional crime in medical activity. However, it is possible to distinguish the understanding of it as such a socially dangerous act intentionally or carelessly committed by a doctor in violation of their professional duties which has caused or may have caused significant harm to the patient's health or caused danger to their life.

Currently, acts in the field of medical care are qualified under the following articles of the Criminal Code of the Russian Federation:

- according to Part 2 of Article 109 as infliction of death by negligence due to misconduct by a professional person;
- according to Part 2 of Article 118 in case of infliction of grave injury to health by negligence

due to misconduct by a professional person;

- Article 122. Infection with HIV;
- Article 238 provides responsibility for the rendering of services which do not meet safety standards;
- Article 293 (neglect).

Note that from these articles none sufficiently takes into account the peculiarities of professional activity in the field of dental orthopedic care to the population. As a rule, a dentist bears personal material responsibility when making a mistake, and a medical institution (regardless of whether public or private) – civil law responsibility.

Results and discussion

Work with previously cured teeth occupies 50% of the practice of an orthopedic dentist. Basically, dental errors during prosthetics are associated with poor quality treatment of root canals, defects in tooth restoration. Thus, the job of a dentist comes with risks and a lot of responsibility. Any doctor can make a mistake, these are only its consequences that matter. With that, the fact that almost every person today needs dental care is out of question.

In the context of the Covid-19 coronavirus pandemic, many orthopedic dentists of private clinics faced possible criminal liability under Article 236 of the Criminal Code of the Russian Federation for violation of sanitary epidemiological rules in case of continued routine admission of patients.

For example, the Decree of the Mayor of the City of Moscow dated 25.03.2020 No. 28-UM temporarily (without specifying a certain period) suspends the provision of dental services except for diseases and conditions requiring dental care in an immediate or emergency form.

Thus, there is a fair question: whether the orthopedic dentist who decided to provide routine dental care in violation of the Decree of the Mayor is threatened with liability under Article 236 of the Criminal Code of the Russian Federation (for violation of sanitary epidemiological rules). The answer is simple: orthopedic dentists who continue providing routine medical care are unlikely to be threatened with liability under Article 236 of the Criminal Code of the Russian Federation. However, the private clinic is threatened with criminal liability under other articles (in particular, Article 238 of the Criminal Code of the RF) and many other extremely negative consequences: suspension of medical license, administrative liability.

The only case when criminal liability under Article 236 of the Criminal Code of the Russian Federation is relevant is a violation of sanitary epidemiological rules, involving the deliberate threat of mass disease or poisoning people. To take

measure due to this offence, it is necessary to prove that the dentist deliberately infected their patients with coronavirus: perhaps, there was the intentional use of an unsterilized instrument or materials after treatment of patients with coronavirus.

Conclusion

It should be noted that only the criminalization of certain acts of dentists cannot solve the problem, a comprehensive approach is important when it is necessary to deal not with the consequences, but with the reasons for the commission of professional crimes by health workers.

However, a system of criminal law sanctions establishing the type and punishment for crimes committed by orthopedic dentists, that is, medical workers in the professional sphere, is capable of entirely fulfilling the function entrusted to it by law only in the case of its adequate and fair legal enforcement.

Conflict of interest. The authors declare no conflict of interest.

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CHARACTERISTICS OF ANISOTROPIC STRUCTURE FORMATION PARAMETERS IN MIXED SALIVA IN PATIENTS WITH COMPLEX JAW PATHOLOGY AND CHRONIC PARODONTITIS

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Mixed saliva is one of the homeostasis systems of the human body, which plays an important role in preserving the integration of oral tissues. Mixed saliva is characterized by a certain molecular structure, the basic properties of saliva are viscosity and fluidity, combined with optical properties of crystalline textures. The research objective is to identify the parameters of anisotropic structure formation of mixed saliva in patients with the complex jaw pathology in combination with chronic parodontitis. The analysis of morphology of diagnosed textures of mixed saliva reveals the mechanism of intensity of formation of "pathological" type masses, desynchronosis and correlates with the severity of xerostomia and chronic parodontitis.

Keywords: *mixed saliva, anisotropic structure formation, xerostomia, parodontitis, complex jaw pathology.*

Mixed saliva (MS) is the most important system involved in the provision of food processing by the human body, it is also an exchange environment in which substances come from the blood serum, and thus homeostasis is maintained [1–7, 9]. MS plays a major role in preserving the integration of oral tissues, it takes part in the implementation of any pathological process [1–7, 9]. MS is characterized by a certain molecular ordering, its most important properties (fluidity and viscosity) are combined with the optical properties of crystals (anisotropy and birefringence) [1–7, 9]. The study of anisotropic structure formation in MS makes it possible to estimate its molecular ordering, that is, the analysis of the shape, number, location and morphology of MS textures. These parameters are considered as structural markers of the state of the entire oral cavity, periodontal tissues, salivary glands and even the body as a whole, which allows to identify new markers of favorable and adverse course of the pathological process [1–7, 9].

This is especially true in patients with complex jaw pathology in combination with chronic periodontitis [6–15]. Combination treatment of cancer patients includes surgical excision of the tumor, chemical and radiotherapy [8–15]. The frequency of development and severity of complications in such patients depend on many factors related to both radiation therapy and individual characteristics of the patient [2, 3, 7–9, 11–15].

Since a significant role in the implementation of protection mechanisms belongs to MS, we consider it relevant to study the characteristics of parameters of anisotropic structure formation in MS in patients with this pathology. The above led to this work.

The research objective was to characterize the parameters of anisotropic structure formation in mixed saliva in patients with the complex jaw pathology in combination with chronic parodontitis.

Materials and methods

The work was performed at the Department of Therapeutic Dentistry and Propedeutics of Dental Diseases, at the Department of Orthopedic Dentistry and Dentistry of General Practice of the Ural State Medical University, as well as at the Department of Controlled Systems Modeling of the Ural Federal University named after the first President of Russia B.N. Yeltsin.

30 patients aged 50 to 65 were examined, making up three study groups of ten people each. The main group included patients after previous resection of jaw segments, who were treated in the radiology department on the basis of SBHI SO "Sverdlovsk Regional Oncology Dispensary" [10, 11]. The other two groups were comparison groups. The first group included somatically safe patients with chronic parodontitis, the second group – somatically safe patients with intact periodontium [6, 11]. Dental examination was carried out in accordance with clinical recommendations: collection and analysis of complaints, anamnestic data, oral cavity examination: the hygiene level assessment with determination of the index (according to Green-Vermillion), the intensity of dental cavities (CFE), the state of periodontal tissues with determination of the bleeding index (Muhlemann H.R., S. Son), CPI index, oral mucosa and salivary glands (sialometry); dental examination cards were filled in [9, 11]. The material of the study was the unstimulated MS [1–7, 9, 11].

To study the parameters of anisotropic structure formation in MS, the method of polarization microscopy was used, allowing to identify objects in polarized light: anisotropic objects. MS textures were studied and photographed on the MBI-15 polarization microscope with zoom x250 in the crossed position of polarizers [1–7, 9, 11]. The results of the study were processed using methods of mathematical statistics. The application software package Statistica 6.0 was used. The data are presented in the form of arithmetic mean values and standard error of the mean ($M \pm m$). The Student's t-distribution was used to establish the significance of differences. Differences were considered significant at $p=0.05$ [2–7, 9, 11].

Results and discussion

Patients of the main group were diagnosed with postradiation xerostomia of the second and third degree, as well as chronic parodontitis of moderate severity [1–7, 9, 11]. The characteristics of parameters of anisotropic structure formation in MS showed the predominance of “pathological” textures not characteristic of the norm: mainly needle-shaped crystals (29%) and atypical shapes (26%) (Figure 1).



Figure 1. Characteristics of parameters of anisotropic structure formation in mixed saliva of patients of the main group: needle-shaped crystals (x250).

Other textures such as liquid crystal lines, confocal textures, spherulites and dendrites of medium size have not been identified.

The presence of these “pathological” (metastable) textures in MS of patients of the main group confirms the formation of adverse conditions for reparation processes in the oral cavity as a whole and periodontal tissues in particular, which will contribute to the development of complications in the future.

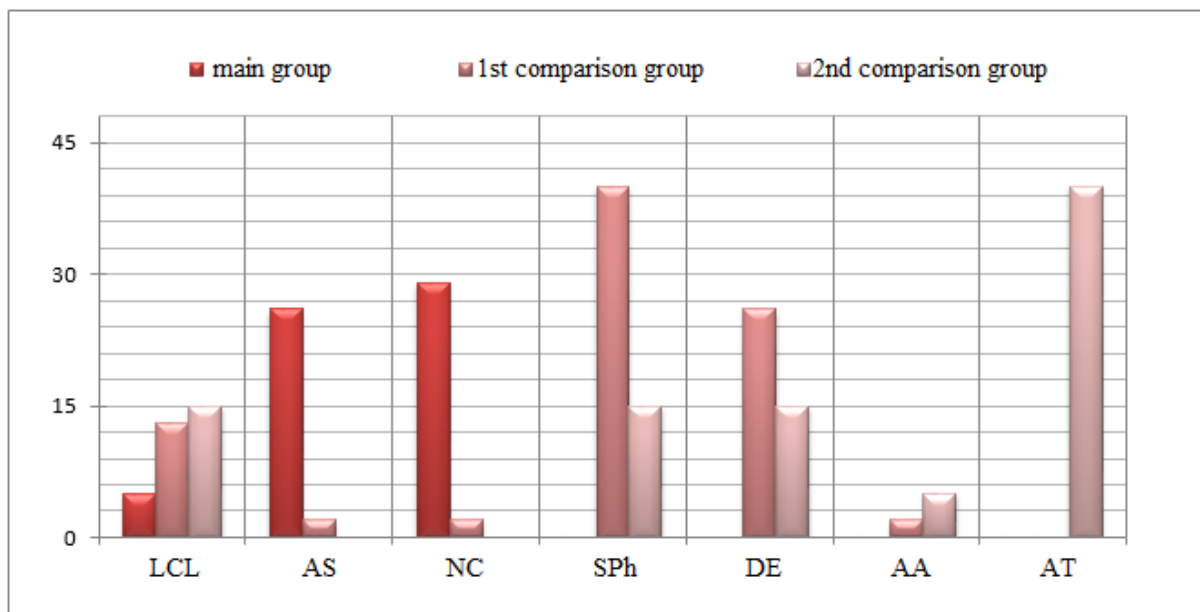


Figure 2. Correlation of parameters of anisotropic structure formation in mixed saliva of patients of the main group (in %).

Patients with intact periodontium (second comparison group) in MS were diagnosed with the predominance of “physiological” textures, “normal” optical forms. This fully (100% of cases) correlates with the state of the periodontium: absence of textures (AT –45%), liquid crystal lines (LCL –20%), anisotropy area (AA – 5%), etc. “Pathological” textures were undefined. Morpho-

textural features of MS confirm the presence of adaptive processes occurring in the oral cavity in general and in the periodontium in particular. All this indicates the importance of the protective function of the studied biofluid [1–7, 9, 11] (Figure 2).

In patients with chronic parodontitis (first comparison group), spherulites (SPh – 25%),

dendrites (DE – 25%), liquid crystal lines (LCL – 13%) were revealed in significant quantities. The anisotropy area and atypical shapes (AS), fan-shaped texture (FT), and needle-shaped crystals (NC) were noted in negligible quantities (up to 2%) [1–7, 9, 11].

As a result of the study, morphological differences of indicators of structure formation of MS were established in patients of all three groups, they reflect the severity of pathological changes and the presence of desynchronization in the studied biofluid. At the same time, there is no sharp increase in the formation of the quantity of textures in the main group of patients.

The analysis of MS allows to obtain complex information on the physical-chemical and structural status of MS in norm (second comparison group) and in pathology (main and first comparison groups), using microamounts of the substrate, as well as the relatively simple and low-cost technology [1–7, 9].

Conclusions

1. Changes in parameters of anisotropic structure formation in mixed saliva of patients against the background of postradiation xerostomia and parodontitis were diagnosed.

2. The formation of textures of mixed saliva of the “pathological” type correlates with the severity of xerostomia and chronic parodontitis ($p \leq 0.05$).

3. The analysis of morphology of textures of mixed saliva in patients (form, quantity, location of aggregate) against the background of postradiation xerostomia and chronic parodontitis reveals the mechanism of intensity of formation and desynchronization of its structure formation.

Conflict of interest. The authors declare no conflict of interest.

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OPTIMIZATION OF THE TREATMENT OF FUNCTIONAL DISORDERS OF MUSCLES OF MASTICATION

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The research objective was to study the degree of efficacy of combined treatment with the help of elastic bands and trays in patients with reduced interalveolar height, suffering from hypertension of muscles of mastication. 103 patients (37 men and 66 women) between the ages of 21 and 65 (mean age 33.2 ± 5.7) were examined. The diagnosis was conducted on the basis of clinical and paraclinical (electromyography) methods of research. The intensity of pain was determined using the Visual Analog Pain Scale (VAS). Elimination of hypertension of muscles of mastication was carried out with the help of trays for patients of the first group (51 people); patients of the second group (52 people) were recommended combined treatment, with the help of elastic bands and trays. A significant decrease in the level of pain in patients of the second group occurred by the 14th day from the beginning of therapy (4.54 ± 0.5 points, $V1-3 = -6.40$; $p1-3 = 0.01$), while in patients of the first group – only to day 21 (5.08 ± 0.6 points, $V1-4 = -6.28$; $p1-4 = 0.01$). A statistically significant change in the bioelectrical activity of muscles of mastication was observed by the beginning of the second week of the preparatory stage of treatment in patients of the second group, and in patients of the first group – by the end of the third week. Thus, the proposed method of treating hypertension of muscles of mastication with the help of elastic bands and trays has qualities that favorably distinguish it from other known methods due to the functioning of muscles of mastication in a partial load mode.

Keywords: reduced interalveolar height, hypertension of muscles of mastication, Visual Analogue Pain Scale (VAS), elastic band, tray.

The use of elastic bands to eliminate muscles of mastication hypertension may become a new direction in orthopedic dentistry. According to the literature, their therapeutic effect is based on the following mechanisms: activation of skin microcirculation, underlying connective tissue and intercellular substance, elimination of metabolic wastes, improvement of lymphatic drainage due to the lifting effect [1], restoration of functional activity of muscles and normalization of joint function by regulating afferent flow coming from the skin proprioceptors, muscles of mastication and TMJ [2], which leads to pain reduction.

The aim of the research is to study the effectiveness of combined treatment with elastic bands and trays.

Materials and methods

To test the joint effect of elastic bands and mouth guards in clinical settings, 103 patients (37 men and 66 women) aged 21 to 65 (average age 33.2 ± 5.7) were examined. The diagnosis was made based on the results of clinical and paraclinical (electromyography) research methods. Pain intensity was assessed using a visual analog pain scale (VAS). The control group in addition to the total number of examined patients consisted of 31 almost healthy people (9 men, 22 women) aged from 16 to 31 (average age 27.8 ± 3.2).

The visual analog pain scale is a subjective

method for assessing the severity of pain syndrome, which has high validity and reliability [3]. The scale is a continuous segment 10 cm long, the initial mark of which corresponds to the absence of pain, and the end point reflects excruciating, unbearable pain. The patient was asked to put a mark on the scale that, in their opinion, corresponds to the intensity of pain. Then, using a ruler, the distance (in mm) from the starting point to the obtained mark was measured. Several approaches are proposed for interpreting the results. We used the classification of Jensen et al. [4]: 0-4 mm – no pain; 5-44 mm – mild pain; 45-74 mm – moderate pain; 75-100 mm – severe pain. At the same time, according to the digital rating scale, 1-4 points correspond to mild pain, 5-6 points – moderate, 7-10 points – severe.

The inclusion criteria were: patients with reduced interalveolar height, suffering from pain, tension, fatigue, and hypertonia of the muscles of mastication lasting at least 1 month.

The exclusion criteria were: a history of TMJ surgery (arthroscopy, arthrocentesis), TMJ trauma, systemic inflammatory diseases of the TMJ (rheumatoid arthritis), patients who had already received treatment for the muscles of mastication para-functions in the last 6 months, inflammatory skin diseases at the site of the intended application of elastic bands, allergic reactions to acrylic adhesive gel, which is part of elastic bands,

individual intolerance to elastic bands.

Statistical data processing was performed using the IBM SPSS Statistics 24 software (IBM, USA). The Kolmogorov-Smirnov criterion was used (to check the normality of the distribution), as well as the Wilcoxon criterion (to analyze the dynamics of pain and evaluate changes in the bioelectric activity of the muscles of mastication at the stages of preliminary treatment).

The main patients' complaint was pain in the muscles of mastication, their rapid fatigue, tension, and limited mouth opening.

During external examination, 38 (73.1%) patients had an increased degree of development of muscles of mastication (hypertrophy), their bulkiness. A reduction of *m. masseter* was observed periodically under the skin of 25 people (48.1%). 32 (61.5%) patients had significant facial asymmetry associated with a shift of the chin to the right or left, as well as due to different degrees of development of the right and left muscles of mastication. The majority of patients (37 people, 71.1%) had a decrease in the lower part of the face, deepening of the nasolabial and chin folds, and drooping corners of the mouth. At the initial examination, the height of functional rest of the muscles of mastication was not determined in 41 people (78.8%). Limited mouth opening (less than 40 mm) was detected in 29 (55.7%) patients.

Palpation of the muscles of mastication and lateral pterygoid muscles revealed their increased tension (47 people, 90.3%), while in some areas of the muscle, or rather, points, there was severe pain (trigger points – areas where pressure causes spasm and pain).

It should be noted that 33 (63.4%) people had teeth marks on the lateral surface of the tongue and the cheek mucosa. The generalized form of various degrees of increased dental attrition was observed in 45 (88.6%) patients, localized – in 7 (13.4%) patients. Wedge-shaped defects were observed in 27 (51.9%) patients.

Based on the results of pain assessment using VAS, all patients (n=103) were equally divided into two groups depending on the pain intensity indicators. To eliminate hypertension of muscles of mastication, patients of the first group (n1=51) were treated with the trays; patients of the second group (n2=52) were recommended a combined treatment with elastic bands and trays.

We used Kinexib Ultraviolet elastic bands (Suzhou Sunmed Co, Ltd, China) approved by Federal Service for Surveillance in Healthcare (registration certificate for a medical device dated April 26, 2019, No. P3H 2019/8334). We used Y-shaped elastic bands, cut individually depending on the size of the impact zone. The elastic band was fixed with a tension of 25–35% on the area of the right and left muscles of mastication (Figure 1).



Figure 1. a – elastic bands fixed to the area of the right and left muscles of mastication; b – trays in the patient's mouth cavity.

Each application lasted for three days for 6 weeks with a one-day break every two procedures. Treatment was evaluated on days 1, 7, 14, 21, and 42 using VAS and electromyography of the muscles of mastication. A tray was used by patients constantly (except for meals) throughout

the entire treatment period [5].

Results and discussion

Patients were surveyed using VAS every 7 days for 42 days. Table 1 shows the comparison of pain level indicators before and after the preparatory

stage before orthopedic treatment in patients of the first group (n1=51). A significant decrease in pain

level indicators occurred by the end of the third week from 8.27±0.9 to 5.08±0.6 points (V1-4=-6.28; p1-4=0.01).

Table 1
Dynamics of changes in pain in patients of the first group depending on the duration of treatment

	Group of patients n1=51						
	Period of treatment						
	Day 1	Day 7	Day 14	Day 21	Day 42	V1-V4	V1-V5
	1	2	3	4	5	p1-p4	p1-p5
M±σ points	8.27±0.9	7.59±0.8	6.92±0.8	5.08±0.6	3.18±0.7	-6.28 0.01	-6.37 0.01

Table 2 shows the dynamics of pain indicators on the VAS scale in patients of the second group. The turning point of treatment aimed at reducing

the level of pain on the VAS scale was determined by the end of the second week from 8.17±0.6 to 4.54±0.5 (V1-3=-6.40; p1-3=0.01).

Table 2
Dynamics of changes in pain in patients of the second group depending on the duration of treatment

	Group of patients n2=52						
	Period of treatment						
	Day 1	Day 7	Day 14	Day 21	Day 42	V1-V3	V1-V5
	1	2	3	4	5	p1-p3	p1-p5
M±σ points	8.17±0.6	7.27±0.5	4.54±0.5	3.27±0.6	2.12±0.5	-6.40 0.01	-6.46 0.01

A significant change in bioelectric activity in the first group at the stage of preliminary treatment was noted on day 21 (Table 3), in the second group of patients – on day 14. Our clinical experience has shown that faster normalization of the electromyographic situation in patients with hypertension of muscles of mastication was observed with the combined effect of elastic bands

and trays, which help in relieving pain, selective functioning of strictly defined muscles, normalization of the distance between the places of attachment of muscles of mastication, creation of a height of functional rest of the muscles of mastication with the appearance of interocclusal distance.

Table 3
Indicators of the maximum amplitude of bioelectric activity of the muscles of mastication

Muscles of mastication		Group of patients					V2-3 p2-3	V4-5 p4-5
		Control (n=31)	Before treatment (n1=51)	Day 21 (n1=51)	Before treatment (n2=52)	Day 14 (n2=52)		
		1	2	3	4	5		
		Maximum amplitude under compression of dentition (volitional stress), mV						
Muscle of mastication	Right	5.7±0.07	11.9±0.09	5.9±0.23	11.4±0.19	5.7±0.14	-6.43 0.01	-6.30 0.015
	Left	5.5±0.13	10.5±0.10	5.7±0.16	10.2±0.18	5.8±0.21	-6.23 0.015	-6.29 0.01
Temporal	Right	4.2±0.11	10.9±0.15	4.3±0.18	10.5±0.15	4.1±0.19	-6.36 0.01	-6.39 0.01
	Left	4.1±0.09	9.9±0.16	4.1±0.20	9.9±0.16	4.3±0.18	-6.23 0.01	-6.28 0.015

Results and discussion

The analysis of the combined treatment using elastic bands and trays showed a high therapeutic effect of the method. This was confirmed, in particular, by the reliable nature of the positive dynamics of pain intensity on the VAS scale, as well as the bioelectric activity of the muscles of mastication. The clinical experience of applying elastic bands and trays allowed us to develop indications for use of this procedure in the complex therapy of patients in the clinic of orthopedic dentistry: 1. pain, hypertension, tension, fatigue of the muscles of mastication; 2. pain in the TMJ; 3. blocking of movements of the lower jaw, TMJ stiffness, difficulty with chewing food.

Applications of elastic bands can be recommended for use at the preventive stage of treatment of hypertension of muscles of mastication, since, despite the possibility of reducing the symptoms of hypertension, there is a risk of their recurrence with repeated mental injuries, chronic emotional stress.

Conclusion

The combined therapy with elastic bands and trays in patients with hypertension of muscles of mastication has qualities that favorably distinguish the method from other known methods: first, the effect of elastic bands is carried out throughout the application time; secondly, the method does not have side effects and complications (with the exception of allergic reactions to the components of the adhesive gel); third, due to the simplicity of execution, it is possible to teach the patient the method of self-applying bands; fourth, it is necessary to note the low cost of elastic bands; fifth, the method has no age and sex restrictions.

Conflict of interest. The authors declare no conflict of interest.

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RECENT DATA ON THE STUDY OF INCREASED ATTRITION AND OTHER DISORDERS OF DENTAL HEALTH IN YOUNG PEOPLE ENGAGED IN ARTISTIC GYMNASTICS IN THE ALTAI STATE MEDICAL UNIVERSITY

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We analyzed the main indicators characterizing the state of dental health of young men independently engaged in artistic gymnastics. In the course of the study, it was found that in most patients, dental disorders were determined in the form of non-carious lesions of the hard tooth tissues manifested by their increased attrition, more often localized, as well as functional disorders of the temporomandibular joints and muscles of mastication, in some cases: inflammatory periodontal diseases [1]. This article provides a comparative analysis of the negative impact on the dental health of young people engaged in artistic gymnastics with and without using the occlusal splint. In the course of research, the efficacy of using the occlusal splint developed by us during artistic gymnastics is proved. Based on the obtained data, the occlusal splint prevents further attrition of the hard tooth tissues, reduces the burden on the periodontal tissues, temporomandibular joint, as well as muscles of mastication.

Keywords: dental health, artistic gymnastics, increased hard tooth tissue attrition, temporomandibular joint.

Health is known to be of particular importance to sports, as it has a direct impact on maintaining the correct integrative response of the body to physical activity and thus on physical performance. Diseases in athletes are not the result of sports itself, but a combination of certain "risk factors" [2, 3]. Their comprehensive study (tailored to account the specifics of each sports), identification, prevention and elimination is a crucial task of modern medicine, the solution of which will help to maintain good health even in the conditions of the most intense training, improve physical performance and enhance the social importance of sports.

It is widely accepted that physical culture and sports significantly reduce the overall incidence, increase work capacity and increase the body's resistance to various unfavorable environmental factors. However, using the maximum training loads required in big sports to achieve the "peak" of athletic form often leads to the opposite effect – immunodepression and increased susceptibility to infectious diseases, negative impact on many body systems, including dental status. A similar negative effect can be achieved in mass physical exercise with an excessive increase in workload.

Modern literature contains numerous, but controversial data on the impact of professional athletic activity on the human body and the dental system in particular. A number of authors note that periodontal tissue diseases, non-carious lesions of the hard dental tissues, hypertension of muscles of mastication and changes in microflora of biotopes of the oral cavity are quite common among

professional athletes. Some scientists argue that moderate physical activity reduces periodontal diseases, while intensive physical activity is a factor in their development [4, 5, 11].

In the age of modern technology, the theme of a healthy lifestyle is more relevant than ever. At present, this problem is becoming more and more important, as the environment is degraded, natural products are being replaced by synthetic ones, and the frenetic pace of a modern person has a negative impact on health. From the perspective of the World Health Organization, health determines the state of complete physical, social and emotional well-being. By definition, a sports fan is someone who enjoys it on their own record, for pleasure and keeping fit. A sports fan does not plan to derive any benefit from their activities. Sports is a hobby, nothing more. Therefore, this person does not have the opportunity to train often and for a long time. For a sports fan, physical activity is not a competition where participants try to do their best.

There are many positive aspects to amateur sports. For example, one of them is improving muscle tone. Muscle tone is the uncontrolled tension of muscle fibers, which results in a muscle contraction while a person is relaxed. Muscle tone is not accompanied by fatigue. Muscle tone is an important indicator to judge the level of a person's core condition. When the neurons responsible for tonic tension are damaged, a defect occurs: hypotension or hypertension of the muscles. Also, when amateur sports activities are dosed out, strength and endurance are increased. As a result, sports activity entails an increase in these

indicators. Endurance allows a person to do longer periods of work that requires more physical input. Immunity improvement is another positive aspect of sports activities. A person's resistance to diseases depends largely on this quality of the body. Sports have a direct impact on its strengthening: during training, the average body temperature rises, which leads to the death of harmful bacteria and viruses. Also, during sports, blood motion accelerates, the flow of which filters the organs and tissues. According to statistics, an adult gets two and a half colds a year. Those who regularly go in for sports fall ill 45% less. The supporting-motor apparatus strengthens during moderate physical activity. With age, degenerative changes in joints, ligaments and muscles become more evident. This leads to many diseases of the musculoskeletal system: muscle and spinal cartilage atrophy, osteoporosis, and diseases of large joints. The regular loads that occur during training give the osseous system the load it needs and contribute to its strengthening. And the last, equally important positive effect of doing independent types of exercises is weight normalization [6, 9].

As a result, it can be concluded that sports are an important part of a person's life, its diversity can help to promote comprehensive development and make people more immune to the negative effects of the outside world. At the same time, very little information is available on the impact of amateur athletic activity, particularly gymnastics, which is quite popular nowadays, on young people's dental status.

Materials and methods

After identifying a number of dental disorders among young people engaged in athletic gymnastics with the use of large weights, they were offered a range of preventive and curative interventions. 36 male examinees agreed to use a modified occlusal splint (patent No 188470 dated 04/15/19), which we have developed, during weightlifting exercises; they formed Group 1. Another group of young men in the same amount after the necessary preventive and curative refused interventions for various reasons to use the occlusal splint and continued their sports activities as before; they formed Group 2.

To detect decay cavity, commonly accepted methods (dental examination, periodontal probing) were used with registration of the localization of decay cavities, tooth fillings, and extracted teeth. The intensity of dental cavities was determined by calculating the indices of the CFE (cavities, fillings, removed teeth) and CFE (surfaces). Non-carious lesions of dental hard tissues, their localization and extension were also determined. The Greene Vermillion hygiene index

(Greene, Vermillion, 1964) was used to assess the hygienic condition of the oral cavity. The extension of the inflammatory process in the gums was determined using the PMA indices modified by Parma (1960) and KPI according to P.A. Leus (1988). Acid-fastness of tooth enamel was assessed by V.R. Okushko et al. (1984) using the enamel resistance test (ERT). Palpation and auscultation of the TMJ was performed, as well as its functional evaluation using the Lira-100 diagnostic complex (NMBT Group, Ekaterinburg, Russia). A functional study of muscles of mastication was carried out using surface electromyography (EMG) on a Synapse apparatus (Neurotech, Taganrog, Russia).

The Mann-Whitney nonparametric test was used to verify the significance of differences between quantitative indicators in independent groups; differences were considered significant at $p \leq 0.05$.

Results and discussion

After carrying out professional oral hygiene to the examined patients in need and the selection of appropriate means and items for hygienic care, as well as the necessary measures for full mouth sanitation and treatment of chronic catarrhal gingivitis, an individual occlusal splint was produced, which was regularly used by young men during sports activities at the gym. If the integrity of the device used was compromised, it was produced again using the same technique in the shortest possible time.

The repeated examination of patients from the observation group was carried out 6, 12, 24 months after the splint was applied.

Dynamic observation of the examined patients did not reveal significant changes in the values of CFE and CFE (s) indices for the entire period over two years, both in groups and between them. The Greene Vermillion Hygiene Index score for both groups was good. In Group 1, the values of the index were stable, while in Group 2, they were slightly worse by the end of the observations. The study of dental cavities resistance of teeth enamel based on the results of the ERT-test showed that there was no marked dynamics of its values during the whole period of observation in both groups and no differences between them during the whole period of observation. The values of the indicator under study corresponded to the relative norm.

Non-carious lesions were taken into account when assessing the condition of dental hard tissues. Non-carious lesions such as increased localized and generalized tooth attrition in 18 and 9 people respectively were identified in Group 1. As already identified in the first phase of the study, physical exercises with weights provoke involuntary clenching of the jaws during the exercise, which leads to the appearance of

abrasivable laminate, more often in the area of the front teeth but often on buccal teeth. Tooth attrition was therefore also identified in Group 2 for young people who continued their studies without an occlusal splint. It should be noted that in all cases the pathological process was characterized by degree I, i.e. the reduction in crown height to 1/3 of the height of the tooth and the decompensated shape, while the anterior teeth were more exposed to attrition.

During the study, the data in Group 1 did not change in patients who used the splint. In Group 2,

the situation was different. In patients with no attrition, it appeared in the 6th month of observation and in the 24th month. In some patients, the localized attrition changed to a generalized form in the 12th and 24th months of observation (Figure 1). From the graphic, it is gathered that after 6 months of observation, there was an increase of one person in the group with a localized attrition. After 12 months, there was one more person with a generalized attrition. After 24 months, there was an increase of one person with a generalized attrition and one person with a localized attrition.

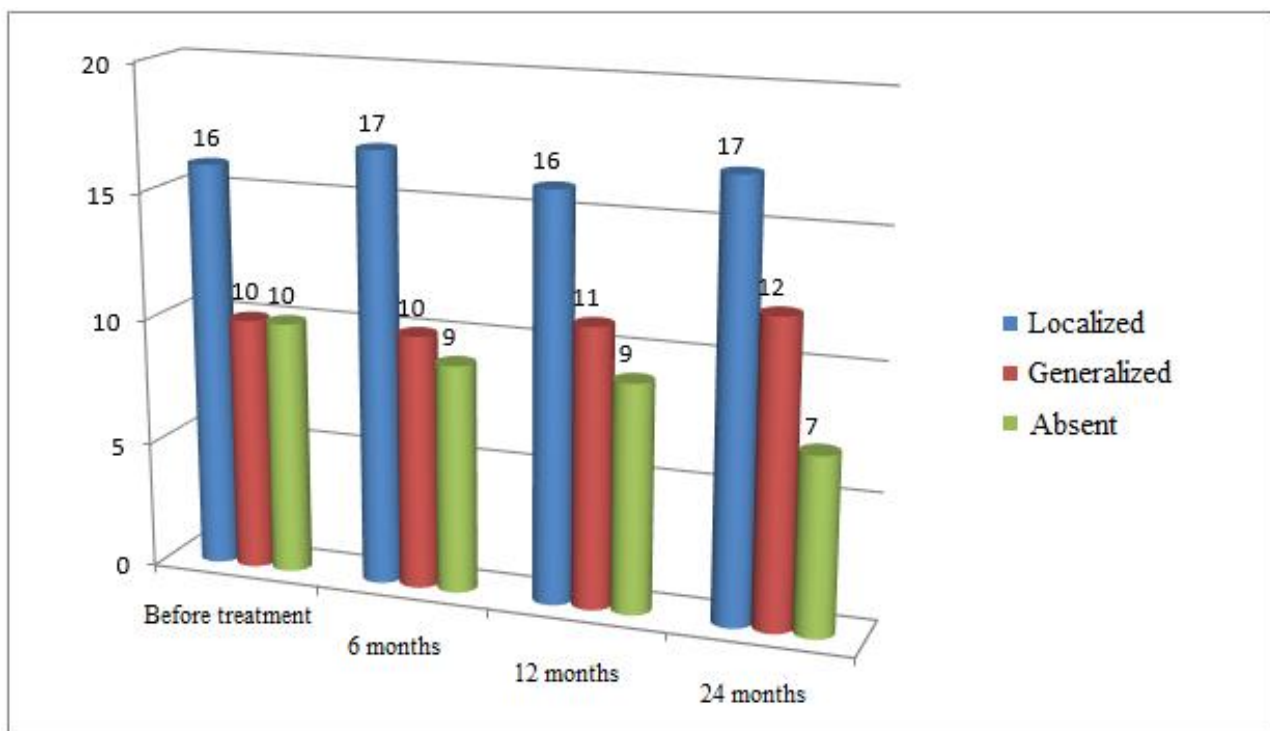


Figure 1. Dynamics of the intensity and prevalence of increased attrition of dental hard tissues in young men who perform athletic gymnastics without using an occlusal splint.

In addition to the presence of increased attrition, patients in the observation and comparison group registered a significant deterioration in the condition of their gums, which was determined by the values of the inflammation prevalence index (PMA) and the complex periodontal index (CPI). Obviously, weighted physical activity resulted in additional stress on periodontal tissues (Table 1).

An objective study, which included palpation of the temporomandibular joint in a physiologically resting state and opening the mouth, revealed that 9 people in Group 1 and 10 people in Group 2 had dysfunction syndrome. Dysfunctional disorders were manifested by the movement of the lower jaw to the side when the mouth was opened relative to the central line of the face. The following coefficients were determined in

both groups when assessing the state of the TMJ using the Lira-100 apparatus: the functional state of the joint (FStJ) and functional support of the joint (FSJ). These indices showed significant improvements in Group 1 by the 12th month of the study, indicating a positive effect on the temporomandibular joint of using the occlusal splint during exercise (Table 2).

Electromyography was used to assess the condition of the muscles of mastication, namely the average compression amplitude in the central bite and the Muscles of Mastication Synchronism Index (MMSI), which is normal at 100% (Table 3). From the data presented below, it can be seen that burdened sports activities in Group 1 had significantly less impact on the state of the muscles of mastication than in Group 2. The indicators in Group 1 have improved significantly by the 12th

Table 1

Effect of combined treatment using the occlusal splint on periodontal tissue condition in young men doing athletic gymnastics (n=70, Md, Q1-Q3)

Study groups		Complex periodontal index (CPI), points	Papillary-marginal-alveolar index (PMA), %
Group 1, n=34	initial state	1.0; 0.8-1.1	26.2; 22.3-30.4
	after 6 months	0.7; 0.5-0.9	16.2; 12.3-18.5
	after 12 months	0.3; 0-0.5 *	8.3; 4.4-12.2 *
	after 24 months	0.2; 0-0.4 * ** ***	2.3; 0-4.4 * ** ***
Group 2, n=36	initial state	1.0; 0.8-1.1	26.5; 22.3-30.3
	after 6 months	0.9; 0.7-1.1	22.7; 18.5-26.4
	after 12 months	1.2; 1.0-1.4	29.2; 26.4-32.5
	after 24 months	1.3; 1.1-1.5 ** ***	40.4; 36.3-44.5 ** ***

Note: * – significant differences indicated; significance was calculated in relation to Group 2, $p \leq 0.05$, Mann-Whitney test; ** – significant differences indicated; significance was calculated in relation to the initial data, $p \leq 0.05$, Mann-Whitney test; *** – significant differences indicated; significance was calculated in relation to data after 6 months, $p \leq 0.05$, Mann-Whitney test.

Table 2

Impact of combined treatment using the occlusal splint on the functional state of temporomandibular joint in young men doing athletic gymnastics (n=70, Md, Q1-Q3)

Study groups		Functional state of the joint (FStJ)	Functional support of the joint (FSJ)
Group 1, n=34	initial state	43.8; 38.6-48.3	52.4; 48.3-55.5
	after 6 months	39.5; 35.3-45.7	46.6; 42.4-49.8
	after 12 months	25.5; 20.3-29.7 *	29.6; 25.4-34.8 *
	after 24 months	22.5; 17.3-25.7 * ** ***	23.6; 19.4-27.8 * ** ***
Group 2, n=36	initial state	45.8; 40.6-50.4	50.4; 46.3-54.4
	after 6 months	48.8; 43.6-52.5	50.6; 47.3-55.7
	after 12 months	50.2; 45.6-54.6	53.4; 49.6-57.4
	after 24 months	60.2; 53.6-64.6 ** ***	63.4; 59.6-67.4 ** ***

Note: * – significant differences indicated; significance was calculated in relation to Group 2, $p \leq 0.05$, Mann-Whitney test; ** – significant differences indicated; significance was calculated in relation to the initial data, $p \leq 0.05$, Mann-Whitney test; *** – significant differences indicated; significance was calculated in relation to data after 6 months, $p \leq 0.05$, Mann-Whitney test.

month of the survey in relation to the first stage of the survey. By 24th month, the Muscles of Mastication Synchronism Index (MMSI) in Group 1 had reached normal values. In Group 2, the rates worsened at each stage of the survey and significantly worsened already at the 12th month of the survey in relation to the first stage of the survey.

The analysis of the results showed that athletic gymnastics at the gym shows numerous changes in dental health indicators: increased prevalence of gum inflammation, non-carious lesions of tooth

hard tissues in the form of attrition, disturbance of the functional state of the temporomandibular joint, as well as signs of hypertonicity and asymmetrical work of the muscles of mastication. In general, the data we have obtained regarding the negative effects of burdening loads on tissues and organs of the oral cavity are consistent with those available in scientific literature [2, 4, 12]. However, this has enabled us to identify appropriate comparison and observation groups and to clearly evaluate the results of the application of the occlusal splint when exercising.

Table 3

Effect of combined treatment using the occlusal splint on the functional status of muscles of mastication in young men doing athletic gymnastics (n=70, Md, Q1-Q3)

Study groups		Average compression amplitude, microvolts	Muscles of Mastication Synchronism Index (MMSI)
Group 1, n=34	initial state	658; 633-684	143; 123-167
	after 6 months	525; 456-543	127; 111-143
	after 12 months	455; 425-479 * **	112; 101-123 * **
	after 24 months	415; 388-441 * ** ***	102; 91-113 * ** ***
Group 2, n=36	initial state	648; 630-672	138; 121-158
	after 6 months	650; 634-675	139; 123-159
	after 12 months	655; 638-678	141; 131-153
	after 24 months	675; 658-701 **	145; 135-153 **

Note: * – significant differences indicated; significance was calculated in relation to Group 2, $p \leq 0.05$, Mann-Whitney test; ** – significant differences indicated; significance was calculated in relation to the initial data, $p \leq 0.05$, Mann-Whitney test; *** – significant differences indicated; significance was calculated in relation to data after 6 months, $p \leq 0.05$, Mann-Whitney test.

The strong positive effect of using an occlusal splint was observed in the study of gum condition. This conclusion was made by us on the basis of a significant reduction in the prevalence of gum inflammation (PMA index, CFE) within 6 months from the start of the study.

The results of the examination of the patients of the observation group on the Lira 100, which was used to determine the functional state of the joint, showed significant improvements during 24 months of the study. The splint is thus highly effective in preventing or stopping increased attrition of hard tooth tissues, thus contributing to stabilising the position of the lower jaw in unfavorable functional conditions and neutralising the increased load on the temporomandibular joint in young people engaged in weight-bearing sports exercises.

Electromyography data that evaluated the average amplitude of the muscles of mastication contraction as well as the symmetry on the right and left showed a pronounced positive effect of the occlusal splint. These data are explained by the creation of a reliable stabilisation of the lower jaw position and protection of hard tooth tissues against autodestruction under unfavorable conditions, by the neutralisation of the increased load on the temporomandibular joint and by the prevention of the development of hypertonicity of the muscles of mastication in young people engaged in weight-bearing sports exercises.

Conclusion

Correction of arising disorders using the occlusal splint has a positive effect not only on the

hard tissues of the teeth, but also on the adaptation of temporomandibular joint tissues and muscles of mastication to the new conditions of existence, under functional load. This also suggests that the use of an occlusal splint can be beneficial not only at an early stage, but also in general at any stage of physical activity, for example, to prevent further attrition of hard tooth tissue and temporomandibular joint dysfunction. This effect has been maintained for quite a long time since the start of the study, which suggests a positive effect of the occlusal splint on periodontal tissues in such patients. In general, the use of occlusal splints in periodontics is one of the most promising areas of this section of dentistry, as it allows for a good effect in combination with the safety of techniques.

Thus, thanks to a number of positive clinical and apparatus effects, the local application of the occlusal splint has led to a reduction in the activity of inflammatory processes in periodontal tissues, stabilization of hard tooth tissues and improvement in the functional state of the muscles of mastication and temporomandibular joint.

The prospects for further study of this problem in the context of the application of occlusal splints are linked to the introduction of the knowledge gained into the gyms for amateur athletes. The use of splints to prevent negative consequences from the first session in the gym may be a promising direction.

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ANALYSIS OF INDICATORS OF PREVALENCE AND INTENSITY OF CAVITIES IN OLDER AGE GROUPS IN URBAN AND RURAL POPULATION OF ALTAI KRAI

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Cavities is one of the most common dental diseases. Despite the successes of modern dentistry in the prevention and treatment of cavities, data of epidemiological surveys indicate that the incidence of cavities and its complications ranges from 70% to 90% in various age groups. The study of cavities is associated, first of all, with the need to obtain key indicators of prevalence and intensity using a unified approach to the analysis and record of hard tooth tissue pathology.

During the work, 300 people of two key age groups of 150 people were surveyed; in each settlement, we examined 50 adults and 50 elderly people living in Rubtsovsk town, Shipunovo village, Tal'menka village in Altai Krai for 5 years or more. In the first group, the age of people was 35–44 years, in the second – 65 years or more. The prevalence of cavities is significantly lower in the first key group than the all-Russian indicator, and in the second key group, on the contrary, is higher. According to the CFE index, the intensity of cavities in the adult population group of Rubtsovsk town and Tal'menka village is lower than the all-Russian indicator, and in Shipunovo village, on the contrary, is higher. The results of the epidemiological survey should be used to plan specialized dental care in the territory of Altai Krai.

Keywords: prevalence and intensity of cavities, epidemiological survey.

Cavities is one of the most common dental diseases. Despite the successes of modern dentistry in the prevention and treatment of cavities [1, 2], data of epidemiological surveys indicate that the incidence of cavities and its complications ranges from 70% to 90% in various age groups. In our country, which belongs to environmental risk areas with a complex climatic geographic location, further studies of the dynamics of dental morbidity are needed for monitoring prevalence and intensity of carious lesions, determination of the need for various types of treatment and preventive care, analysis of the effectiveness of preventive programs among population key groups [1, 2, 3, 4].

As a result of three national dental epidemiological examinations conducted in Russia with the support of WHO (World Health Organization), it was revealed that environmental and hygienic factors has a significant impact on dental morbidity of children and adults of the country [2, 4]. Currently, in dentistry, it is important to assess the risk of cavities depending on age, sex, the presence of visceral pathology, etc. The study of cavities is associated, first of all, with the need to obtain key indicators of prevalence and intensity using a unified approach to the analysis and record of hard tooth tissue pathology.

The population of Altai Krai is characterized by the uneven density in contrast to other regions of Russia. The environmental situation is unfavorable due to the close location of the Semipalatinsk test site for nuclear devices, large industrial

enterprises; low fluorine and micronutrient content in drinkable water of certain territories of the region creates prerequisites for increasing the indicators of dental morbidity [2]. However, there are no updated data currently on the structure and prevalence of dental diseases in the populated areas of Altai Krai, which does not allow to predict the need for dental care, plan and implement preventive programs.

The objective was to study and analyze the prevalence and intensity of cavities indicators in the adult and elderly population of Altai Krai on the basis of the epidemiological dental survey taking into account WHO criteria and the level of dental care.

Materials and methods

During the work, 300 people of two key age groups of 150 people were surveyed; in each settlement, we examined 50 adults and 50 elderly people living in the town of Rubtsovsk, village of Shipunovo, village of Talmenka in Altai Krai for 5 years or more. In the first group, the age of people was 35–44 years, in the second – 65 years or more.

The results of the standardized dental examination were included into the WHO record (2012). 32 index teeth were studied, the signs of hard tissue diseases were assessed according to the CFE index, where "C" – cavities of the crown or root of a tooth, a filling with cavities, "F" – a filling within the crown or root of a tooth of satisfactory quality, "E" – an extracted tooth as a result of a

complication of cavities or for other reasons. In addition, the presence of orthopedic structures was noted: build-up, crowns. In case of violation of the marginal fit of the filling, excess material causing local inflammation of the gum, tooth fracture, color change, restoration was considered to be of unsatisfactory quality. The hard tissue CFE index in the examined patients was determined by the worst indicator, the dependence of the indicator on sex was studied. The cavities prevalence was calculated by the ratio of the number of examined persons having any sign of cavities to the total number of examined persons. The cavities intensity was determined as the sum of clinical signs of carious lesions.

The CFE index testified to the quality of dental care in age groups 35–44 years and 65 years or more. In the assessment, the DCL index (dental care level) was used according to P. A. Leus (1987), calculated by the formula: $DCL = C + A \cdot 100\% / CFE$, where C – the average number of carious lesions; A – the average number of extracted teeth not recovered by prostheses; CFE – the average value of the carious process intensity coefficient. Criteria for the DCL assessment are as follows: low level – less than 10%, 10–49% – insufficient level, 50–74% – satisfactory level, 75% and above – good level of care.

Data processing was carried out using the computer programs Statistics 6.1 and Excel 2007. The arithmetic mean (M), root mean square deviation (Sx), error of the arithmetic mean (m)

were determined. The values of continuous quantities are represented in the form of $M \pm m$. In cases of normal distribution, the Student's t-test was used to compare samples. In multiple comparison, the Bonferroni correction was used. The differences were considered significant at $p < 0.05$.

Results and discussion

The epidemiological dental examination in adult and elderly population groups of Altai Krai revealed high prevalence of cavities, which was $96 \pm 0.02\%$ in adult groups in Rubtsovsk town, Shipunovo village, $94 \pm 0.02\%$ in Tal'menka village, which, according to the literature, is slightly lower than the all-Russian indicator (98%). The cavities prevalence in the elderly groups of Rubtsovsk town and rural residents was $100 \pm 0.02\%$ (all-Russian indicator – 99%) (Table 1).

In general, the intensity of hard tooth tissue cavities in the adult population of Rubtsovsk town (Group 1) amounted to 9.96 ± 0.7 , Tal'menka village (Group 1) – 11.89 ± 0.74 , which is significantly lower than the all-Russian indicator (13.93); in Shipunovo village (Group 1), the same indicator was 27.35 ± 0.93 , which is much higher than the all-Russian indicator. In the second key group in the elderly population of all mentioned populated areas, the CFE index was significantly higher than the all-Russian (22.75) and amounted to 25.1 ± 0.84 in Rubtsovsk town, 26.04 ± 0.66 in Shipunovo village, 27.18 ± 0.55 in Tal'menka village.

Table 1

Prevalence and intensity of cavities in the studied population groups of Altai Krai, $M \pm m$

Indicators	Altai Krai						All-Russian indicator	
	Rubtsovsk town		Shipunovo village		Tal'menka village		Group 1	Group 2
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2		
Cavities prevalence (%)	$96 \pm 0.02\%$	$100 \pm 0.02\%$	$96 \pm 0.02\%$	$100 \pm 0.02\%$	$94 \pm 0.02\%$	$100 \pm 0.02\%$	98	99
Cavities intensity	$9.96 \pm 0.7^*$	$25.1 \pm 0.84^*$	$27.35 \pm 0.93^*$	$26.04 \pm 0.66^*$	$11.89 \pm 0.74^*$	$27.18 \pm 0.55^*$	13.93	22.75

Note: * – the difference is statistically significant ($p < 0.05$) compared to the all-Russian indicators.

The study result of indicators of the intensity of pathological signs of cavities and its complications showed a reliable predominance of components "F" and "C" according to the CFE index of the first group in persons in the age group 35–44 years (Table 2). The value of the component "Filling" in the same age group was 4.36 ± 0.64 in Rubtsovsk town, 5.15 ± 0.55 and 5.6 ± 0.61 in Shipunovo village and Tal'menka village respectively, which is slightly lower than the all-Russian indicator (6.02). This indicates a smaller number of filled teeth and is confirmed by the average values of the

component "cavities" in Shipunovo village (4.1 ± 0.45) and Tal'menka village (3.79 ± 0.41), which were higher than the indicator for Russia (3.13). This may indicate insufficiently effective provision of therapeutic dental care in the districts of Altai Krai. It can also be noted that in Rubtsovsk town, on the contrary, the indicator of component "C" is lower than the all-Russian one and equals 2.54 ± 0.32 , that is, specialists of the dental profile rather timely identify, treat cavities and its complicated forms.

Table 2

Intensity of certain indicators of the CFE index in the 1st studied group in adult population of Altai Krai, M±m

Intensity of certain CFE indicators	Rubtsovsk town	Shipunovo village	Tal'menka village	All-Russian indicator
Cavities	2.54±0.32*	4.1±0.45*	3.79±0.41*	3.13
Filling	4.36±0.64*	5.15±0.55*	5.6±0.61*	6.02
Extracted tooth	2.67±0.41*	4.71±0.44	3.65±0.38*	4.78

Note: * – the difference is statistically significant ($p<0.05$) compared to the all-Russian indicators.

The indicator of the intensity of carious pathology “Extracted tooth” in all three populated areas was below the all-Russian indicator (4.78): in the adult population of Shipunovo village, it amounted to 4.71±0.44, Tal'menka village – 3.65±0.38, Rubtsovsk town – 2.67±0.41.

Among persons of 65 or more years (Group 2) in the CFE structure (Table 3) compared to Group 1, the signs “F” and “E” significantly prevailed in residents of Rubtsovsk town and Tal'menka village, and only the sign “E” prevailed in Shipunovo village. The intensity of pathology “Cavities” was in the range from the minimum values of 4.12±0.54 (in Rubtsovsk town) to the maximum ones – 5.26±0.57 (in Shipunovo village), which is twice or more times higher than the average all-Russian indicator (1.72). Comparing

these indicators with Group 1, it is possible to note the insufficient efficacy of the provision of dental care of therapeutic profile to elderly people. As a whole, the numerical indicator of pathology “Filling” in Group 2 is statistically significantly higher than the all-Russian average (2.77) and is 4 times higher than its values in Group 1 in Tal'menka village (20.78±1.3). In residents of Rubtsovsk town (8.88±1.24), the difference in indicators with the first age group is significant, and in Shipunovo village (4.72±0.72), there is no significant change. Comparing the numerical values of the component “Extracted tooth” with the all-Russian indicator (18.26), it can be noted that they were statistically significantly lower only in Rubtsovsk town (12.1±1.2) and Shipunovo village (16.06±1.06) (Table 3).

Table 3

Intensity of certain indicators of the CFE index in the elderly population of Altai Krai, M±m

Intensity of certain CFE indicators	Rubtsovsk town	Shipunovo village	Tal'menka village	All-Russian indicator
Cavities	4.12±0.54*	5.26±0.57*	4.76±0.59*	1.72
Filling	8.88±1.24*	4.72±0.72*	20.78±1.3	2.77
Extracted tooth	12.1±1.2*	16.06±1.06*	19.4±1.24*	18.26

Note: * – the difference is statistically significant ($p<0.05$) compared to the all-Russian indicators.

When determining the dependence of the cavities intensity indicator on sex in 152 women and 148 men who participated in dental examination (Table 4), it was shown that the CFE in adult population of Rubtsovsk town is significantly lower in the group of men (15.94±1.92) compared to the group of women (32.13±3.64), and in elder persons, the average value of the CFE index was significantly higher in men (67.07±4.75) than women (37.17±2.25). In Shipunovo village in the first key group, the difference in the CFE index between men (18.08±1.26) and women (12.58±1.08) was insignificant; in the second key group, the cavities intensity was almost two times higher in women (78.21±3.43) than men (42.44±1.97). In

Tal'menka village in both key groups, the same indicator was almost two times higher in women than men.

The integral indicator of the quality of dental care in the DCL index was 52.25±0.02% among residents of Rubtsovsk town in the first age group and was assessed as satisfactory, approaching the lower border; and in persons of the second key group, this indicator was significantly lower (48.35±0.02%) and was already considered insufficient (Table 5).

With regard to rural residents of both age groups, the level of dental care was significantly insufficient, suggesting a deterioration in the system of dental care, lack of qualified personnel and public education.

Table 4

Intensity of cavities depending on sex in Altai Krai

Intensity of cavities by sex in Altai Krai	Women, Group 1	Men, Group 1	Women, Group 2	Men, Group 2
Rubtsovsk	32.13+3.64*	15.94+1.92	37.17+2.25*	67.07+4.75
Shipunovo	12.58+1.08*	18.08+1.26	78.21+3.43*	42.44+1.97
Tal'menka	33.96+3.37*	18.83+1.75	80.45+4.42*	49.9+2.3

Note: * – the difference is statistically significant ($p < 0.05$).

Table 5

Indicators of quality of dental care according to the DCL index of Altai Krai

Integral indicator of quality of dental care according to the DCL index	Group 1	Group 2	Indicator of quality of dental care according to the DCL index
Rubtsovsk	52.25±0.02%*	48.35±0.02%*	50–74% satisfactory / 10–49% insufficient
Shipunovo	32.24±0.02%*	39.45±0.02%*	10–49% insufficient
Tal'menka	44.32±0.02%*	43.28±0.02%*	10–49% insufficient

Note: * – the difference is statistically significant ($p < 0.05$) with respect to the criteria of the DCL index (dental care level) according to P.A. Leus (1987).

Conclusion

Thus, the epidemiological dental examination within the framework of the third national project allowed to study the prevalence of cavities and the intensity of signs of carious lesions in key age groups 35–44 years and 65 years in the urban and rural population of Altai Krai. In general, the prevalence of cavities is significantly lower in the first key group than the all-Russian indicator, and in the second key group, on the contrary, is higher. According to the CFE index, the intensity of cavities in the adult population group of Rubtsovsk town and Tal'menka village is lower than the all-Russian indicator, and in Shipunovo village, on the contrary, is higher. At the same time, it is possible to note the predominance of “F” indicators in all three populated areas and “C” in both villages, while the component “E” is lower than the all-Russian indicator. In whole, in the elder age group, the intensity of cavities is higher than the all-Russian indicator, in particular, the components of “Cavities” and “Filling” in all three populated areas, whereas the indicator “Extracted tooth” is higher only in Tal'menka village. This is reflected in the indicator of the level of dental care to the Altai Krai population, which does not even reach a satisfactory criterion in the majority of cases and needs corrective organizational measures and changes in the treatment process as being insufficient. The results of the epidemiological survey should be used to plan specialized dental care in the territory of Altai Krai.

Conflict of interest. The authors declare no conflict of interest.

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ECOLOGICAL CAUSALITY OF THE PREVALENCE OF ORAL MUCOSA DISEASES IN CHILDREN IN ALTAI KRAI

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According to WHO, human health is 20% dependent on environmental factors. Thus, in Russia, about 30% of the population lives in environmentally unfavorable areas [5]. It is known that the prevalence of not only general somatic pathology, but also dental morbidity increases in their territory. Therefore, reducing the negative impact of environmental factors on public health is a priority for any State. For the industrialized regions of Western Siberia, the impact of anthropogenic environmental loads on the health of the population is carried out in the context of the combined effects of social economic, natural climatic, technogenic and radiochemical factors, which leads to the formation of specific regional problem situations and priorities in environmental pollution causing negative changes in the state of public health [1, 2, 6]. Thus, for Altai Krai, regional specificity is manifested in the effect of a set of industrial and radiation influences associated with the consequences of the Semipalatinsk test site in 50–60s of the previous century [3, 4]. Identification of regional ecological features of prevalence of dental diseases in children in conditions of Altai Krai is relevant.

The research objective was to assess the state of the oral mucosa in children living in populated areas of Altai Krai with an unfavorable ecological situation in order to further improve the system of providing specialized assistance to them.

Keywords: ecological factors, diseases of the oral mucosa in children.

The organization of the research included development and realization of its three steps: the first step was planning (preclinical step), the second was clinical researches, and the third was the analysis of obtained results.

Materials and methods

The basis to define the five inhabited localities of Altai Krai with the environment fit to the research purpose was the materials provided by the Ministry of Natural Resources and Environment of the Russian Federation for Altai Krai. They are Vesolyoyarsk village with the unfavorable environmental factors (radioactive pollution), Yarovoye town with the unfavorable environmental factors (chemical pollution),

Zarinsk town with the unfavorable environmental factors (chemical pollution), Gornyak town in Loktevsky District with the unfavorable environmental factors (radioactive and chemical pollution), and Rebrikha village without exposed unfavorable environmental factors.

Using the method of randomization, the sample of 767 Altai Krai inhabitants who constantly live in the above mentioned inhabited localities was formed. It included five samples of the first order (by the locality) and three samples of the second order (by the age). In addition, the comparison group consisting of 160 boys and girls who live in the unpolluted Rebrikha village was distinguished. The ordering of the research participants of the first and second orders is indicated in tables 1 and 2.

Table 1

Ordering of the research participants of the first order

Sample of the first order	Vesolyoyarsk village	Yarovoye town	Zarinsk town	Gornyak town	Rebrikha village
Prevailing environmental pollution	radioactive	chemical	chemical	radioactive + chemical	none
Number of the research participants (number of people)	159	149	150	149	160

The rigid age stratification criteria are defined in the research. As Table 2 shows, according to these criteria in the second order sample the groups of research participants aged 6, 12 and 15

years were formed and ordered by sex equally. The mentioned groups were chosen to control the key points of the permanent dentition forming according to the recommendations of the Ministry

Table 2

Sample of the second order	Ordering of the research participants of the second order														
	Vesyoloyarsk village			Yarovoye town			Zarinsk town			Gornyak town			Rebrikha village		
	B	G	Σ	B	G	Σ	B	G	Σ	B	G	Σ	B	G	Σ
Research participants aged 6 years (number of people)	23	27	50	33	16	49	25	25	50	27	23	50	24	30	54
Research participants aged 12 years (number of people)	19	34	53	25	25	50	25	25	50	24	25	49	29	27	56
Research participants aged 15 years (number of people)	36	20	56	26	24	50	25	25	50	25	25	50	22	28	50
Total number of research participants (number of people)	78	81	159	84	65	149	75	75	150	76	73	149	75	85	160

Note: B – boys, G – girls.

of Health of the Russian Federation.

The open, single-centre, randomized, controlled, retrospective, and cross-sectional research was conducted. The examination of the children was performed according to the special scheme with the anamnestic data study and clinical laboratory assessment of the mouth organs and tissues condition. The analysis of their connection with presence and features of the xenobiotic, unfavorable factors in Altai Krai was conducted.

The examination of the oral mucosa was conducted with the help of two mirrors. The labial and buccal mucosas, the mucogingival junction, gums, the retromolar space, the tongue, the mouth floor, and the hard and soft palate were examined sequentially. To count the prevalence of the mucosal diseases, the number of people with defined diseases features were divided by the total number of examined people and multiplied by 100%.

To prove statistical hypotheses, the nonparametric methods were implied. While comparing the numerical data of the two connected samples, the Wilcoxon signed-rank test (T) was used and while comparing the numerical data of the two independent samples – the Wald-Wolfowitz runs test.

The statistical data analysis, charts and tables construction were made on the personal computer with the Intel Pentium IV processor using SPSS 13.0 and StatSoft Statistica 6.0 for Windows software packages of the statistical data analysis. The calculations were made in the MS Excel spreadsheet program, Windows XP.

Results and discussion

One of the directions of the complex dental research was to study the abnormal changes of the children's oral mucosa.

The quantitative non-indexed indicators of the oral mucosa condition in all the studied samples were ranked to the control, the absolute value of which was equal to one in each case. As a result, the artificial indexes mostly indicating the influence on the studied unfavorable environmental factors were chosen.

For this purpose, we had indexed all the studied clinical indicators in the different samples of the children from the inhabited localities under research. The comparing sample in all cases was the sample of the children from Rebrikha village.

While examining the sample of the children aged 6 years, the following results were obtained (Table 3).

The mucosal diseases defined in the children from Vesyoloyarsk village were registered in 18.0±3.9% of cases: geographic tongue (8.0±2.8%), recurrent herpetic stomatitis (4.0±2.0%), traumatic injury of the oral mucosa (4.0±2.0%), and cheilitis (2.0±1.4%).

While conducting the clinical examination of the children from Gornyak town, the oral mucosa pathologies were defined in 18.0±4.2% of cases: geographic tongue (10.0±3.1%), recurrent herpetic stomatitis (2.0±1.4%), traumatic injury of the oral mucosa (2.0±1.4%), and cheilitis (4.0±1.4%).

The clinical assessment of the children from Zarinsk town allowed to define lymphadenopathy of the head and neck. The mucosal diseases appeared in 14.0±3.7% of cases. Geographic tongue, labial fissures, and cheilitis were found in the same number of children (2.0±1.4% of cases each) and geographic tongue in 8.0±2.8% of cases.

While examining the children from Yarovoye town, the mucosal diseases were registered in 16.0±4.0% of cases: geographic tongue (10.0±3.18%), recurrent herpetic stomatitis (4.0±2.0%) and traumatic injury (2.0±1.4%).

While making the clinical assessment of the 6-year-old children from Rebrikha village, the mucosal diseases were registered in 9.1±3.0% of

cases: geographic tongue (5.5±2.3%), recurrent herpetic stomatitis (1.8±1.3%) and traumatic injury (1.8±1.3%).

Table 3
Occurrence of the mucosal diseases in the children aged 6 years living in the inhabited localities with different environmental situations

Inhabited locality	Studied indicators and their values (M±m), %					
	Oral mucosa diseases, total number	Geographic tongue	Recurrent herpetic stomatitis	Traumatic injury of the oral mucosa	Cheilitis	Labial fissures
Vesyoloyarsk village	18.0±3.9**	8.0±2.8	4.0±2.0	4.0±2.0	2.0±1.4**	0
Gornyak town	18.2±4.2**	10.0±3.1**	2.0±1.4	2.0±1.4	4.0±1.4**	0
Zarinsk town	14.0±3.7	8.0±2.8	2.0±1.4	2.0±1.4	2.0±1.4**	0
Yarovoye town	16.0±4.0	10.0±3.2	4.0±2.0	2.0±1.4	0	0
Rebrikha village	9.1±3.0	5.5±2.3	1.8±1.3	1.8±1.3	0	0

Note: ** – statistically significant difference of the indicators from the smallest indicator (Wald-Wolfowitz runs test, $p < 0.05$).

More often than in the children from the comparison group (Wald-Wolfowitz runs test, $p < 0.05$), cheilitis was defined in the children from Vevillageyarsk village and Zarinsk town (with the mixed chemical pollution). At the same time, there were no differences in the degree of occurrence of the herpetic and traumatic oral mucosa abnormalities between the samples and no indications of labial fissures were defined.

While examining the sample of the children aged 12 years, the following results were obtained (Table 4).

Prevalence of the mucosal diseases in the children from Vesyoloyarsk village achieved 28.0±5.2%. Recurrent herpetic stomatitis, geographic tongue, and labial fissures were defined in the equal number of the examined children (3.7±1.9% each case), trauma of the oral mucosa was defined in 5.6±2.3% of cases, and cheilitis – in 11.3±3.3% of cases.

The mucosal diseases in the children from

Gornyak town were defined in 24.0±4.8% of cases: geographic tongue (6.0±2.4%), recurrent herpetic stomatitis (4.0±2.0%), traumatic injury of the oral mucosa (2.0±1.4%), cheilitis (8.0±2.8%), labial fissures (2.0±1.4%), and growths on the oral mucosa (2.0±1.4%).

The mucosal diseases in the children from Zarinsk town were registered in 12.0±3.4% of cases, herewith, recurrent herpetic stomatitis was defined in 2.0±1.4% of examined children, geographic tongue – in 4.0±2.0% of cases, and cheilitis – in 6.0±2.4% of cases.

Prevalence of the mucosal diseases in the children from Yarovoye town was 16.0±4.0% and was defined as geographic tongue (8.0±2.8%), labial fissures (2.0±1.4%), and cheilitis (6.0±2.4%).

The mucosal diseases in the children from Rebrikha village were registered in 8.7±2.9% of cases: geographic tongue (5.3±2.3%), recurrent herpetic stomatitis and labial fissures (1.7±1.3% in each case).

Table 4
Occurrence of the mucosal diseases in the children aged 12 years living in the inhabited localities with different environmental situations

Inhabited locality	Studied indicators and their values (M±m), %					
	Oral mucosa diseases, total number	Geographic tongue	Recurrent herpetic stomatitis	Traumatic injury of the oral mucosa	Cheilitis	Labial fissures
Vesyoloyarsk village	28.0±5.2*	3.7±1.9	3.7±1.9	5.6±2.3**	11.3±3.3*	3.7±1.9
Gornyak town	24.0±4.8*	6.0±2.4	4.0±2.0	2.0±1.4	8.0±2.8**	2.0±1.4
Zarinsk town	12.0±3.4	4.0±2.0	2.0±1.4	0	6.0±2.4**	0
Yarovoye town	16.0±4.0**	8.0±2.8	0	2.0±1.4	6.0±2.4**	2.0±1.4
Rebrikha village	8.7±2.9	5.3±2.3	1.7±1.3	0	0	1.7±1.3

Note: * – statistically significant difference of the indicators from the smallest indicator (Wald-Wolfowitz runs test, $p < 0.005$); ** – statistically significant difference of the indicators from the smallest indicator (Wald-Wolfowitz runs test, $p < 0.05$).

While assessing the mucosal diseases, the summary frequency of the mucosal diseases occurrences in Vesolyoyarsk village, Gornyak town and Yarovoje town statistically significantly exceeded the control factors (Rebrikha village). In addition, in the children aged 12 years from Vesolyoyarsk village significantly more often than in the comparison group cheilitis and traumatic injuries were defined.

While studying the samples of the children aged 15 years, the following results were obtained (Table 5).

The mucosal diseases in this age group in the children from Vesolyoyarsk village were registered in 28.4±5.3% of cases, herewith, recurrent herpetic stomatitis, geographic tongue and the mucosal traumas were defined in the equal number of the examined children (5.3±2.3% in each case), labial fissure in 3.6±1.8% of cases, and cheilitis in 8.9±2.9% of cases.

The mucosal diseases prevalence in the children from Gornyak town was 30.0±5.4% of cases geographic tongue (8.0±2.8%), recurrent herpetic:

stomatitis (4.0±2.0%), traumatic injuries of the oral mucosa (4.0±2.0%), cheilitis (10.0±3.1%), labial fissures (2.0±1.4%), and growths on the oral mucosa (2.0±1.4%).

The mucosal diseases in the children from Zarinsk town were registered in 20.0±4.4% of cases. Recurrent herpetic stomatitis and mucosal traumas were defined in the equal number of the examined children (2.0±1.4% in each case), geographic tongue in 4.0±2.0% of cases, cheilitis in 8.0±2.8% of cases, and labial fissures in 4.0±2.0% of cases.

The mucosal diseases in the children from Yarovoje town were registered in 18.0±4.2% of cases. Recurrent herpetic stomatitis, labial fissure, mucosal trauma were defined in the equal number of the examined children (2.0±1.4% in each case), geographic tongue in 4.0±2.0% of cases, and cheilitis in 8.0±2.8% of cases.

The mucosal diseases prevalence in the children from Rebrikha village was 10.8±3.7%. Recurrent herpetic stomatitis, geographic tongue, and labial fissures were defined in the equal number of the examined children (4.0±1.4% in each case), mucosal trauma in 2.0±2.0% of cases.

Table 5

Occurrence of the mucosal diseases in the children aged 15 years living in the inhabited localities with different environmental situations

Inhabited locality	Studied indicators and their values (M±m), %					
	Oral mucosa diseases, total number	Geographic tongue	Recurrent herpetic stomatitis	Traumatic injury of the oral mucosa	Cheilitis	Labial fissures
Vesolyoyarsk village	28.4±5.3**	5.3±2.3	5.3±2.3	5.3±2.3	8.9±2.9*	3.6±1.8
Gornyak town	30.0±5.4**	8.0±2.8	4.0±2.0	4.0±2.0	10.0±3.1*	2.0±1.4
Zarinsk town	20.0±4.4	4.0±2.0	2.0±1.4	2.0±1.4	8.0±2.8*	4.0±2.0
Yarovoje town	18.0±4.2	4.0±2.0	2.0±1.4	2.0±1.4	8.0±2.8*	2.0±1.4
Rebrikha village	14.0±3.7	4.0±1.4	4.0±1.4	2.0±1.4	0	4.0±1.4

Note: * – statistically significant difference of the indicators from the smallest indicator (the Wald-Wolfowitz runs test, $p < 0.005$); ** – statistically significant difference of the indicators from the smallest indicator (the Wald-Wolfowitz runs test, $p < 0.05$).

While assessing the mucosal diseases, the summary frequency of the mentioned diseases in Vesolyoyarsk village and Gornyak town statistically significantly exceeded the indicators of the comparison group. In addition, in the children aged 15 from Vesolyoyarsk village, cheilitis was defined significantly more often than the control indicator.

The obtained quantitative indicators of all the studied samples were indexed to the control, the absolute value of which was equal to one in each case. To balance influences of the ages, the control factor was equal to one for each age group separately.

As a result, the artificial indexes mostly indicating the influence of unfavorable

environmental factors on the studied indicators were chosen. These factors were the mucosal diseases indicators (Table 6).

In general, in the children always living in radioactive polluted localities, the mucosal diseases were defined more than two times more frequently than in the children from the comparison group.

Conclusion

Thus, the results of the oral mucosa condition of the children show that the mucosal diseases in the examined children living in Altai Krai localities with unfavorable environmental factors under the study were defined much more often than in the children from the comparison group. Herewith,

Table 6

Artificial indexes to the control indicator (Rebrikha village) of the mucosal diseases frequency in the children living in the inhabited localities with different environmental situation

Inhabited locality	Artificial indexes of the studied indicators, scores			Average score
	Mucosal disease			
	6 years	12 years	15 years	
Vesyoloyarsk village	2.0	3.2	2.0	2.4
Gornyak town	2.0	2.8	2.1	2.3
Zarinsk town	1.5	1.4	1.4	1.3
Yarovoye town	1.8	1.8	1.3	1.6
Average score	1.83	2.30	1.70	1.9

the maximum of the mucosal diseases in the samples was registered in the children aged 12. The maximum values of the artificial index of the mucosal diseases was defined in the children living in Vesyoloyarsk village (2.4 averagely in all age groups) and Gornyak town (2.3 averagely in all age groups) with radioactive pollution.

Conflict of interests. The author declares no conflict of interest.

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DEDICATED TO OUR TEACHER, COLLEAGUE AND MENTOR

Altai State Medical University, Barnaul

O.E. Shishkina, I.Yu. Gatal'skaya, M. Taktak

The purpose of the article is to acquaint a broad audience of readers with the creative path of Vladimir Ivanovich Semennikov, a wonderful scientist, teacher, doctor, our colleague and mentor, professor, Doctor of Medical Sciences, Head of the Department of Surgical Dentistry and Maxillofacial Surgery of the Altai State Medical University. He realized his vocation as a teacher and professional of his field in his scientific works, his scientific-practical school "Optimization of diagnosis, treatment and prevention of diseases of oral cavity organs and maxillofacial area".

One by one, living witnesses of an entire era leave us, taking away with them the gathered experience, traces of their joys and worries, inseparable from the history of the university and from personal destiny.

A severe ailment mercilessly ripped Vladimir Ivanovich Semennikov, our teacher and colleague, professor, Doctor of Medical Sciences, from our lives. From the life he loved so much! Untimely! At its peak! Leaving a sense of unspoken words, incompleteness! Leaving the bitterness of deep loss! So go the best. So Vladimir Ivanovich left...

The future professor was born on March 18, 1956 in the distant village of Maly Kunaley, Buryat ASSR. He was growing up an intelligent, independent and lively child. He studied well at school, impressing teachers and classmates with depth of knowledge. As a child, he dreamed of becoming a diplomat, but in 1973 he entered Omsk State Medical Institute (OSMI) with ease. Having studied one year at the Faculty of General Medicine, he realized that 7 years was a long study, and he needed to earn money faster to support not only himself, but also to help the mother and two sisters, so he transferred to the Faculty of Dentistry. After graduation, he entered clinical residency, and then completed postgraduate studies at the Department of Surgical Dentistry, majoring in Surgical Dentistry. During the whole period, Vladimir Ivanovich combined study with work, gaining experience from the very basics of a medical specialty: first, as a nursing assistant, then a nurse, then an emergency dentist.

After defending his Candidate's dissertation (1982) on the topic "Biomechanical substantiation of ways to improve the fixation of mandibular fragments" at the age of 27, he was invited to work as an Assistant at the Department of Surgical Dentistry of OSMI, since the young scientist's commitment and thirst for knowledge were appreciated. It is not known how his fate in Omsk would have turned out, but the opening of the Faculty of Dentistry in Barnaul changed his life.

In 1991, at the age of 35, a young, capable teacher and scientist was invited to head the

Department of Dentistry at the first organized Faculty of Dentistry of Altai State Medical Institute. This event took place thanks to the protection of academician V.K. Leontiev, as well as perspicacity and intuition of the rector of ASML, Professor V.M. Bryukhanov (1945–2020), and Dean of the Faculty, Associate Professor V.A. Popov. In 1993, Vladimir Ivanovich was elected the Head of the Department of Surgical Dentistry, continuing his scientific and practical research in the field of biomechanical basics of fixation in diseases and damage to the bones of the facial skull, which came to its logical conclusion in his Doctor's dissertation (2004) "Optimization of methods of fixation of bone fragments of the facial skull and their clinical-biomechanical assessment". In 2005, V.I. Semennikov was awarded the academic title of Professor.

Vladimir Ivanovich was among those teachers who combine a huge teaching experience, a huge amount of knowledge and a truly creative, hearty attitude to the process of training itself, an incredible working capacity. They say about such people that they work "with zest", giving everything... Pedagogical skills of Vladimir Ivanovich can not be assessed by any titles and qualifications. Such teachers are simply called the Teacher with a capital letter.

He created his author's scientific and practical school: "Optimization of diagnosis, treatment and prevention of diseases of the oral organs and maxillofacial area".

He has grown a galaxy of his followers, some of them continue working at the Department of Surgical Dentistry and Maxillofacial Surgery of Altai State Medical University, others successfully work in practical healthcare both in Altai Krai, the Altai Republic, the Republic of Tuva, and abroad. These are A.V. Molchinov, T.A. Sharapova, A.V. Nagikh, E.R. Kamaldinov, O.E. Shishkina, M. Taktak, I.Yu. Gatal'skaya, I.N. Chechina et al. He trained 10 candidates of medical sciences.

Vladimir Ivanovich created and directed the student scientific society of the Faculty of Dentistry for 15 years. He was respected and loved by

students for his exactingness and strictness. In 2008, according to the results of the student questionnaire, he was awarded the title "Best Teacher of the Year".

Excellent personal qualities and professionalism of a high level made communication with him outstandingly valuable and memorable. His openness, honesty and adherence to principles drew boundless respect of the people around him. It was interesting with him. He knew how to subtly joke and feel joy in life. Vladimir Ivanovich knew classical literature and art, classical and pop music, sang well, danced, loved theatre, sport, tourism. He was distinguished by great diligence, the desire to introduce everything new and progressive into the work. He was true... Vladimir Ivanovich had a heightened sense of justice. He was praised and scolded, he could be loved or disliked, but no one remained indifferent to his words. He did not give any break to himself or others, he did not allow himself to deviate from the truth, no matter how bitter it was. It was not easy with such a life position, but being independent meant living for him. This was the reason that in 2016 he left the position of the Head of the Department, left the university and opened a private dental clinic Author's Dentistry of Professor V.I. Semennikov, in which he continued his not only clinical but also scientific work. In March 2020, he returned to his native university, to his native department at the invitation of authorities.

Doctor V.I. Semennikov had a wide clinical range of methods for diagnosing and treating the pathology of the maxillofacial area and oral organs. The doctor of the highest qualification category in the specialty "Surgical Dentistry", he had certificates of a specialist in Surgical Dentistry, Maxillofacial Surgery, Therapeutic Dentistry. He was a recognized expert in dentistry and maxillofacial surgery. He conducted appointments and counseled dental patients with complex clinical cases, assisted doctors of the city and the region, and took initiatives to optimize dental care to the population.

Vladimir Ivanovich's main scientific research was aimed at finding mini-invasive, resource-saving and stationary replacement technologies, optimizing dental care to the population. They were confirmed by 39 patents of the Russian Federation for inventions and utility models.

Professor Semennikov wrote 10 monographs, more than 300 scientific articles in foreign, central and local press, 34 study guides.

Vladimir Ivanovich's reports aroused constant interest at international symposia, all-Russian, republican, local congresses and conferences. His works were published in Israel, Greece, Denmark, Belgium, Holland, France, Poland, Japan, Spain, UAE, Thailand.

For the achievements in scientific, pedagogical and practical activities, Professor V.I. Semennikov was awarded by the Presidium of the European Academy of Natural Sciences with the Nobel Laureate Albert Schweitzer Medal and Diploma of Honorary Professor of Europe (Germany, 2012). For his great contribution to the preservation and strengthening of dental health of the population of the Russian Federation, he was awarded the Certificate of Honor of the Ministry of Health and Social Development of the Russian Federation (2009), Certificate of Honor of the Dental Association of Russia (2010). He was the Prize Winner of Altai Krai in the field of science and technology (2010). For many years of conscientious work, he was awarded: the Certificate of Honor of ASMU (2004), the Certificate of Honor of the Main Directorate of Altai Krai for Health and Pharmaceutical Activities (2007), Certificate of Honor of the Barnaul City Duma (2007). In 2012, Vladimir Ivanovich was awarded the Honorary Title "Veteran of Labor of Altai Krai", and in 2013 – "Excellence in Health Care". And the most important reward is the love of his students and graduates.

In September 2020, his life ended. He gave 25 years of impeccable work to his beloved university.

We remember and mourn. Colleagues, students.

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compulsory to give the definition for all used statistical terms, abbreviations and symbolic notations (e.g. M – sample mean, m (SEM) – error in mean, STD – sampling standard deviation, p – reached level of significance). In case of combinations like $M \pm m$ it is necessary to give the meaning of each symbol, and also sample volume (n). If the used statistical criteria have limitations in their usage, specify how these limitations were checked and what the results of these checks are (e.g. in case of using parametric methods it is necessary to show how the normality fact of sample distribution was proved). Avoid non-specific usage of terms which have a few meanings: (e.g. there are a few variants of correlation coefficient: Pearson, Spearman and others). Average quantities should not be given more precisely than for one decimal mark in comparison with base data, mean-square deviation and error in mean – for one more mark precisely.

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