Pathogenetic Aspects of the Development of Dental Diseases in Athletes

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ABSTRACT

Health is key to the future of humanity. The World Health Organization (WHO) has developed a program to "promote health, keep the world safe and reach vulnerable populations with services." The program puts forward new targets to be achieved by 2023: ensure health coverage for the entire population at all ages; ensure improved health and well-being.In the world, the priority direction of medicine in the 21st century is the implementation of the national project “Healthcare. The purpose of this project is to preserve and strengthen the health of the population around the world through the formation of a healthy lifestyle and increasing the availability and quality of medical care [8, 2]. For the implementation of the project, a patient-centered health care model (People-Centered Health Care) was proposed

Keywords: Healthcare

Introduction. This innovative approach improves care by understanding the causes and influences of health, paying attention to minimal diagnostic signs, choosing the most appropriate way to treat acute conditions, monitoring the effects of treatment and symptoms, finding and learning to live a healthy lifestyle, giving feedback to the health care system. The spread of such installations will make medical care effective and accessible to all [1, 7, 17].

The movement towards forecasting, prevention and a healthy lifestyle is the modern trajectory of healthcare development.

In recent years, the importance of sports in improving the health of the population has increased by involving them in physical education [4, 2, 18]. However, elite sports are associated with a high risk of occupational diseases in athletes. The data of the scientific literature of the last decade proved that only 15-28% of those examined are healthy among athletes [2, 9, 4].

Comparison of the structure of morbidity in athletes and people who are physically active but not involved in sports showed that it is different. The prevalence of diseases of the cardiovascular system among athletes is 66%, non-athletes - 23.5%, injuries and diseases of the musculoskeletal system in the former accounted for 45% of the total incidence, and in the latter - 8% [2, 12, 19].

A great influence on the manifestations of pathology in people involved in sports is exerted by the specificity of the type of motor activity and the environment in which this activity is carried out.

For example, chronic diseases of the musculoskeletal system are relatively rare among swimmers and much more common among representatives of speed-strength sports and martial arts. Diseases of the peripheral

nervous system are more common in athletes, weightlifters, wrestlers and football players than in other athletes. The greatest number of diseases of ENT - organs occurs in people involved in shooting - 71.5%, water sports - 45%, winter sports - 40% [10,20].

Physical and emotional stress inherent in various sports leads to changes in the state of the muscles of the maxillofacial region, temporomandibular joint, articulation and occlusion, hard tissues of teeth and periodontium [2, 12]. Violation of occlusion, a change in the interalveolar distance can cause premature fatigue of athletes, which leads to a deterioration in the general condition of the body. Also, a significant influence of external environmental factors on the indicators of local immunity of the oral cavity in people involved in sports and, as a result, the occurrence of dental diseases was established [4, 7, 13].

According to WHO, the pathology of hard dental tissues is the earliest form of damage to the dentoalveolar system [1]. There is a continuous increase in the prevalence of dental caries among young people up to 90%. In athletes, depending on the sport, including against the background of overtraining syndrome, the prevalence of dental caries is at the level of 96% [12]. Among all dental diseases, the combination of lesions of carious and non-carious origin is of particular importance. Early diagnosis and an integrated approach to the treatment of pathology of hard dental tissues improves the quality of life and, as a result, improves the indicator of social success of a person [7].

Despite the great achievements in sports medicine, the problem of the high prevalence of dental diseases among athletes remains unresolved, which makes it relevant for a deeper study.

Prevention of diseases of the oral cavity today is becoming an integral part of medical and hygienic programs of medical control in sports [5]. Many authors note the need to combine professional oral hygiene in combination with targeted immunocorrection [8, 3]. For the prevention of major dental diseases in athletes, a number of authors propose the use of special dental splints necessary to protect the maxillofacial region from damage during sports [9].

In our opinion, the main and most accessible method of preventing dental diseases is the use of oral hygiene products. Despite the great variety, modern personal hygiene products have a number of disadvantages. These may include a drying effect on the oral mucosa, the need for long-term use before the onset of a therapeutic and prophylactic effect, high abrasiveness, the development of individual intolerance, and high cost [11].

Thus, the development of innovative therapeutic and prophylactic agents with a new composition and properties is an urgent task that is of interest to chemists and doctors of various profiles (dentists, dermatologists, immunologists, endocrinologists). In the literature studied by us, there are single studies on the treatment of hard dental tissues in people involved in sports. The issues of choosing the optimal period of the training cycle for sanitation of the oral cavity are considered [8, 9]. However, there are no data on the choice of filling material for the complex treatment of hard dental tissues in athletes, which makes this topic important for a deeper study.

***Purpose of the study*.** On the basis of a clinical and laboratory study of the state of hard dental tissues in athletes, to develop and substantiate the tactics of complex treatment and prevention of diseases of hard dental tissues.

Materials and methods. A single-center randomized clinical-instrumental controlled open study was carried out. The study involved 45 athletes, among them 84% of men and 16% of women, aged 18 to 35 years, of different levels of fitness, in different periods of the training cycle. The average duration of professional sports is 15 years. The main group was divided into 3 subgroups according to the Olympic classification of sports: a subgroup involved in cyclic sports (athletics, swimming, skiing, etc.), speed-power (tennis, boxing, weightlifting, etc.), team sports (football, hockey, etc.). Control group: 20 people who are physically active but not involved in sports.

The gender and age composition of the control group is similar to the study group. All

participants underwent a comprehensive dental examination, which included the main research methods (determination of complaints, history taking, external examination, examination of the oral cavity, identification of diseases of the hard tissues of the teeth, malocclusion) and additional (X-ray examination, "Hamburg testing", Teck-scan diagnostics , evaluation of oral fluid, cytological examination of the buccal epithelium, electrometry of hard tissues of teeth, assessment of resistance of hard tissues of teeth).

In order to analyze the microstructural features of the hard tissues of the teeth of athletes, the following studies were carried out: semi-contact atomic force microscopy (Asylum MFP 3D microscope, USA), scanning electron microscopy (Quanta 200 FEI SEM microscope), Raman microspectroscopy (HORECA LabRam 3000 micro-Raman spectrograph), Vickers method (device PMT-3). The material for the experimental study was longitudinal sections of the enamel of permanent teeth, 4x5x1.5 mm in size. Teeth were extracted for orthodontic reasons in athletes aged 18-30 years. Sections are obtained by sawing the tooth crown with a water-cooled diamond tool. Based on the data obtained, the tactics of complex treatment of athletes with diseases of hard dental tissues was optimized by using the developed innovative therapeutic and prophylactic toothpaste for individual oral hygiene and a reasonable choice of filling materials for the restoration of defects in hard tissues of teeth of various localization. In the process of implementing this study, an innovative therapeutic and prophylactic toothpaste was used.

Its basis is an organosilicon glycero-hydrogel - Silativit, a biocompatible drug exhibiting high transcutaneous activity, a bioactive filler - nanostructured hydroxyapatite with a particle size of 20-80 nm.

To determine the safety, general and local effects of the developed therapeutic and prophylactic toothpaste, a number of experiments were carried out on laboratory animals. Assessment of the dynamics of physical and chemical properties of hard tissues of teeth under the influence of a new toothpaste by semi-contact atomic force microscopy using an Asylum MFP3D microscope (Asylum Research, USA), the Vickers method (PMT-3 device), scanning electron microscopy (Quanta 200 FEI microscope) SEM), Raman microspectroscopy (HORECA LabRam 3000 micro-Raman spectrograph).

The main group daily used a new treatment-and-prophylactic toothpaste. The comparison group used the prototype. The probands undertook to use the samples of therapeutic and prophylactic toothpaste given to them. No other forms of oral hygiene were allowed during the study period.

Dental examinations were performed before the study, after the first application, after 12 hours, 7 days, 14 days, 1, 6, 12 months). Clinical studies of the quality of filling defects in hard tissues of teeth were carried out within 24 months. To restore defects in hard tissues of teeth, the method of direct restoration was used with 4 groups of materials: Dyract XP compomer (Dentsply), thermoplasticized composite filling material Filtek.

All participants in the study were diagnosed with increased tooth wear (ICD-10, code K03.0), dentin caries (ICD-10, code K02.1) of various localization. Within the groups, patients were divided into subgroups by random sampling. Criteria for exclusion from the study: dental anomalies, violation of the integrity of the dentition, dysfunction of the temporomandibular joint, increased tone of the masticatory muscles, the volume of the defect in the hard tissues of the teeth is more than 30%. The functional state of the restorations was assessed one week after restoration, as well as at 1, 6, 12, and 24 months. To assess the safety of fillings, the “Criteria for evaluating composite tooth restorations” were used (Nikolaev A.I., Gilmiyarov E.M., Mitronin A.V., 2015).

Assessment of the quality of life of patients due to dental health was carried out using a specialized validated questionnaire "Profile of the impact of dental health" OHIP-14-aestetic-RU (Gileva O. S., 2013).

Results and discussion. While high physical and emotional loads during training and sports competitions contribute to the development of oxidative stress, they affect the state of the muscles of the maxillofacial region,

the temporomandibular joint, articulation and occlusion, the state of hard tissues of teeth and periodontium [2, 18, 12].

It should be noted that diseases of the hard tissues of the teeth lead to a violation of the digestive function, a decrease in the body's resistance to the action of infectious factors, its sensitization, and a decrease in the quality of life [7, 12, 9].

Numerous studies indicate a wide spread of carious and non-carious lesions of hard dental tissues among athletes, in comparison with people who are physically active, but not involved in sports [3, 2].

According to a dental examination of participants in the Olympic Games in Rio de Janeiro in 2016, only 28.2% were sanitized. Dental caries occurred in 75% of cases, abfraction defects in 59% [11]. In Russia, these values reach 80% [2].

According to a cohort epidemiological study among young people from various professional sports clubs in the central region of the republic, the most common pathology is dental caries (K02), which was detected in 90% of the examined. The obtained results characterize the prevalence of caries as high according to the WHO criteria. The average value of the KPU index was 9.7±0.8, which indicates a high intensity of caries in this age group. The structure of the KPU index is dominated by the component "K" - 6.0 ± 1.1, which indicates an insufficient level of dental care in this category of patients. Complicated forms of caries occurred in 44% of cases [5,16].

Non-carious lesions of hard tissues of the teeth were also identified: increased abrasion of teeth, fluorosis, erosion in the ratio of (30%), (10%), (35%), respectively. Abfractional defects were noted in athletes with parafunction of the masticatory muscles (bruxism, strong clenching of the teeth at the time of mental or physical stress). High rates of prevalence of non-carious lesions of the teeth in power athletes may be a sign of the presence of significant functional changes in the craniomandibular system [13].

Trauma occupies a special place among non-carious lesions. The problem of acute traumatism of the maxillofacial region in athletes has been quite thoroughly studied by many scientists [1, 8]. It has been proven that its prevalence depends on many factors, in particular, on the type of sport, its specificity, gender of the athlete, age, level of sportsmanship, experience in sports, etc. [6]. According to the literature, the largest proportion of injuries of the dentition occurs in such sports as boxing (24.89%), hockey (18.84%), rowing (17.76%), wrestling (12.58%) [6, 35 , 91]. Teeth fractures within the enamel, a horizontal fracture of the tooth crown, mainly in the central part of the upper jaw, and horizontal fractures of the roots were noted in attacking football players and hockey players [7, 8].

The prevalence of caries among athletes is 96% and depends on the intensity of training, qualifications, age, sports experience. The ratio of "uncomplicated" to "complicated" dental caries among sportsmen is defined as 6:1. The prevalence of traumatic injuries of teeth is 6%. Increased abrasion of hard tissues of teeth occurs in 2% of the examined. Multiple dental caries in highly qualified athletes is diagnosed in 57.2% of cases [4].

The average value of the KPU index of athletes involved in power contact sports is 9.9 ± 5.46, which corresponds to a high degree of intensity of damage to hard dental tissues by caries. Increased tooth wear occurred in 60% of the examined [7, 4].

When analyzing the prevalence and intensity of dental caries in athletes, depending on the direction and conditions of the training process, the level of sportsmanship in comparison with physically active individuals who do not go in for sports, risk groups for dental caries and "chronic periodontal lesions" were identified. These include athletes with high sports qualifications who train in endurance sports, swimming, weightlifting, martial arts [2, 4].

Multiple caries and the presence of chronic periapical foci of infection were noted in representatives of different sports. Most often, multiple dental caries is diagnosed in sports such as cross-country skiing - 66.6%, rhythmic gymnastics - 60.1%, athletics - 60%. In martial arts, this pathology is less common - in 49.4% of athletes [4]. Of particular importance are

chronic foci of infection, which do not manifest themselves at rest and during normal physical activity, but can have a negative effect on the body during intense physical exertion, provoking many diseases. It is known that athletes with chronic foci of infection have an increased risk of sudden death due to the so-called "bacterial collapse", which is why chronic foci of infection are proposed to be attributed to additional risk factors for sudden death in sports [9, 4].

A number of studies have revealed the relationship of multiple dental caries and periodontal pathology with connective tissue dysplasia of the heart, which can make it possible to predict the dental and cardiovascular morbidity of athletes, including their mutual aggravation. The study of this author also showed that 97.6% of athletes (weightlifters and swimmers with the qualification of masters of sports) have combined dental pathology (high intensity of caries and chronic periapical foci) [12, 11].

When studying the dental status of athletes with impaired adaptation of the cardiovascular system to physical activity and heart pathology, the intensity of caries, as well as the frequency of its complications, is significantly higher than in the population. Complications of caries occurred in patients with overexertion cardiomyopathy [12, 1].

Professional athletes have an unsatisfactory level of oral hygiene, especially in the pre-competitive and competitive period. The main complaints of people involved in sports are bleeding gums, bad breath and hyperesthesia of the teeth [1].

Athletes included in the study complained of carious cavities (74%), defects in hard tissues of teeth (35%), bleeding gums (42%), presence of dental deposits (25%), bad breath (15%), hyperesthesia teeth (35%). During the survey, 38% of athletes complained of discomfort in the temporomandibular joint area and stiffness of the muscles of the maxillofacial region, teeth grinding during sleep.

As a result of a dental examination, it was revealed that only 5.5% of athletes are healthy. The indicators of dental indices were determined as follows: KPU(h)=0, ONI-S=0.7±0.1; PMA=8±2%. The index of intensity of dental caries KPU (h) in the group of athletes involved in cyclic sports was 10.2±3.5, speed-strength - 13.4±2.5, team sports - 12.6±3.2, which corresponds to a high level of 12 intensity of dental caries in accordance with WHO criteria, in the control - 7.3 ± 4.08 - corresponds to the average level of intensity of dental caries.

The primary dental examination revealed non-carious lesions of hard tissues of the teeth: increased tooth wear (K03.0, ICD-10), tooth erosion (K03.2, ICD-10), tooth fracture (S02.5, ICD-10). The presence of increased abrasion of the 1st degree according to the classification of M.G. Bushan was detected in 53±2.7% of athletes, in the control group - 35%±3.6. The horizontal form is more common among people involved in speed-strength sports - 94±2.6%. In other sports groups, these figures are 1.5 times less. In the control group, the horizontal form of abrasion occurred in 68±3.4%.

A high prevalence of combined lesions of hard dental tissues in athletes (caries and abrasion) was revealed - 96% ± 4.6, which is 1.6 times higher compared to the control group. Various dental anomalies were observed in 35.7±6.14% of athletes with increased wear and tear and in 28.5±5.4% of individuals who were physically active but not involved in sports. An unsatisfactory level of oral hygiene was equally noted among patients of the main and control groups (OHI-S 1.84±0.18). In the main group, the intensity of periodontal inflammation is more pronounced.

Thus, the PMA index in athletes is 35.73±9.14, which corresponds to the average severity of gingivitis, in the control group - 24.45±6.11. On the mucous membrane of the mouth in athletes, traces of acute and chronic trauma (K13.1) are determined, manifested in the form of a hematoma or erosion, on the cheeks along the line of closing of the teeth - 38, 3 ± 8.6, on the mucous membrane of the lips - 21.5 ± 5, 3. In the analysis of occlusal contacts in athletes, violations of premature and supercontacts during closing of teeth (100%), deviation of the vector of occlusal forces (88.6%), violation of occlusal balance (77.2%)

were revealed. The value of the roughness of the enamel of the athletes' teeth is 15.5±1.6 nm, which is 2 times higher in comparison with these indicators for people who do not go in for sports.

The general condition and weight gain of the animals that received the studied composition did not differ from that of intact individuals. No visible pathological changes were found in the areas of application of the composition during visual examination.

The change in the duration of the latent period of hexnal sleep after a 30-day intragastric administration of a 50% solution of a new pharmacological composition was 3.15±0.05 min versus 3.3±0.03 min with the introduction of distilled water ($p < 0.05$), which gives the opportunity to conclude that the new toothpaste does not have a negative effect on the body of laboratory animals. No visible pathological changes were found in the areas of application of the drug during visual examination.

The total score for the appearance of erythema in accordance with a five-point scoring system was 0 points. When evaluating the results of the conjunctival test, in none of the cases, changes in the sclera, conjunctiva, lacrimal duct, other than physiological, were determined. 18 The results obtained indicate the absence of toxic properties of the new toothpaste and the safety of its use. In the biochemical analysis of the blood of laboratory animals, a change in the level of activity of AST and ALT was observed during intragastric administration and skin application of the studied toothpaste, corresponding to that in animals of the control group.

Conclusions. Thus, a series of experimental studies showed the safety and biocompatibility of the use of a new toothpaste. The second stage of the experiment was the assessment of changes in the physical and chemical properties of hard tissues of teeth under the influence of a new toothpaste. Using PC-AFM, it was found that the enamel of the studied samples has a smooth surface with an inhomogeneous microrelief. On all studied sections, depressions and large outgrowths are determined, which are crystals of 19 hydroxyapatite. A comparison of the obtained images showed that the samples differ from each other in the sizes of inhomogeneities.

Analysis of the oral fluid of athletes demonstrates low values of sIg A - 24.2±0.65 IU/ml, an increase in the content of leukocytes 45.7±9.15 cells/μl, which is 1.7 times more than in the control group; the value of total protein is 0.80±0.15 g/l, which is 1.3 times more than in the control group. The results obtained indicate a violation of the barrier function of saliva.

In an experimental study of the structural features of the hard tissues of the teeth of athletes using the PC-AFM method of enamel, a heterogeneous relief was established, recesses in the form of microporous foci on the occlusal surface, a pore size of up to 0.5 μm, blurring of the contour of the interprism spaces.

Thus, the most significant disorders of the dental health of athletes can be considered combined lesions of hard tissues of the teeth (caries and increased abrasion), the presence of traumatic occlusion, dysfunction of the TMJ, increased tone of the masticatory muscles, traumatic lesions of the oral cavity, and a decrease in the protective properties of saliva. In this regard, the individual prevention of dental diseases in representatives of different sports with the use of new personal hygiene products is of particular importance.

Literature.

1. Бабаев Е.Е. Мамедов Ф.Ю. Альтернативные методы лечения заболеваний пародонта на фоне развития синдрома перетренированности. // Росс.стом.ж. 2014, (1), с24-27.
2. Гаджиев Д.Г. Стоматологический статус профессиональных спортсменов. // Казанский мед.ж., 2020:101(3): с.365-370.
3. Ягудин Р.Х., Кузьмина Ж.И. Стоматологическая заболеваемость спортсменов олимпийского резерва и пути её снижения. // Ж.Практич.медиц., 2013: 1 (1-2): с.148-151.
4. Andrade R.A., Modesto A., Evans, et al. Prevalence of oral trauma in Para-Pan

American games athletes. Dent. Traumatol. 2013; 29:280-4.
5. Azodo C.C., Odai C.D., Osazuwa-Peters N., et al. A survey of orofacial injuries among basketball players. Int. Dent. J. 2011; 61:43-6.
6. Cullinan M.P., Seymour G.J. Periodontal disease and systemic illness: will the evidence ever be enough? Periodontol 2000 2013; 62: 271-86.
7. Davidson M., Keating J. Patient-reported outcome measures (PROMs): how should I interpret reports of measurement properties? A practical guide for clinicians and researchers who are not biostatisticians. Br. J. Sports Med. 2014; 48:792-6.
8. Ризаев Ж.А., Назарова Н.Ш. Состояние местного иммунитета полости рта при хроническом генерализованном парадонтите. Вестник науки и образования 2020. № 14 (92).Часть 4. С 35-40.
9. Rizayev Jasur Alimdjanovich, Nazarova Nodira Sharipovna. Assessment Of Changes In The Condition Of Periodontal Tissues In Workers Exposed To Exposure To Epoxy Resin. The American journal of medical sciences and pharmaceutical research №2 P 14-17.
10. Ризаев Ж.А., Назарова Н.Ш. Состояние местного иммунитета полости рта при хроническом генерализованном парадонтите. Вестник науки и образования 2020. № 14 (92).Часть 4. С 35-40.
11. Ризаев Ж.А., Назарова Н.Ш. Эффективность савокупного лечения болезней парадонта и слизистой оболочки работающих с вредными производственныыми факторами. Проблемы биологии и медицины.2020. №3 (119) . С 85-88.
12. Ризаев Ж.А., Назарова Н.Ш., Бердиев. Т.А. Шиша толали тузилмаларни ишлаб чикариишда NBF гингивал гелининг самарадорлиги. Жамият ва инновациялар. 2020, октябрь С 678-682.
13. Ризаев Ж.А., Назарова Н.Ш.,. Бердиев. Т.А. Шиша толали тузилмаларни ишлаб чикариишда NBF гингивал гелининг самарадорлиги. Жамият ва инновациялар. 2020, октябрь. С 565-569.
14. Ризаев Ж.А., Назарова Н.Ш.. Эффективность савокупного лечения болезней парадонта и слизистой оболочки работающих с вредными производственныыми факторами. Проблемы биологии и медицины. 2020. №3 (119). С 85-88.
15. Khazratov A.I., Rizaev Y.A. Oral condition in patients with colon cancer. International Scientific and Practical Online Conference "Actual Problems of Fundamental, Clinical Medicine and Distance Learning Opportunities." 2020. P. 137-138.
16. Ризаев Ж.А., Хазратов А.И. Морфологические изменения слизистой полости рта при онкологических патологиях // Актуальные проблемы фундаментальной, клинической медицины и возможности дистанционного обучения, 2020. Т. 115.
17. Ризаев Ж.А., Хазратов А.И. Макроскопическая картина слизистой оболочки полости рта у больных с онкологическими заболеваниями толстой кишки // Проблемы биологии и медицины,122, 5, 114-117, 2020
18. Khasanov, Ilkhom Ikromovich; Shomurodov, Kakhramon Erkinovich; Khazratov, Alisher Isamiddinovich; Clinical x-ray study of complications of dental implantation and sinuslifting in patients with maxillar sinusitis, Asian journal of pharmaceutical and biological research,10,3,2021
19. Rizaev J.A., Khazratov A.I., «Цитоструктурное изменение слизистой оболочке полости рта при раке толстой кишки», Journal of Biomedicine and Practice, 6, 5, 2020

20. Ризаев Ж.А., Хазратов А.И. «Состояние полости рта у больных раком толстой кишки». Актуальные проблемы современной медицины, 117, 1.1, 99, 2020