

# Evaluation of the Dental Morbidity of Cyclical Sportsmen and Ways to Solve It

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## ABSTRACT

**Background:** some studies showed that dental diseases in athletes occupy a leading position in comparison with any others, and it will be explained by their greatest occurrence. Aim is to assess the level of dental morbidity in athletes involved in cyclic sports, and to develop methods for its effective prevention. **Methods:** 230 athletes in various levels of training, engaged in cyclic sports, was dental examined in different periods of the training cycle, at the age of 18-25 years, the average duration of sports experience was  $5.7 \pm 1.12$ g. Oral hygiene index (IH), WHO oral hygiene index (OHI), papillary-marginal-alveolar index (RMA), periodontal index (PI), the intensity of damage to the hard tissues of the teeth (KPU) and computer using Microsoft Excel and BioStat-2009 were used in order to check athletes oral health. **Results:** against the background of overtraining and incomplete dental health, both a decrease in its level and a deterioration in the quality of life of athletes can occur. In this situation, there is a need to develop a targeted comprehensive program for the prevention of major dental diseases in athletes. The frequency of occurrence of caries among rowers in canoes and canoes averages 79.2%. maximum PMA index, reflecting the severity of gum inflammation, is also determined in rowers ( $18.32 \pm 5.46$ ). An early sign of the development of catarrhal gingivitis and periodontitis is the appearance of bleeding gums, which is estimated by the SBI bleeding index. At the initial stage, it is detected even in the absence of other signs of the disease. **Conclusions:** Inflammatory periodontal diseases in athletes (including those in a state of overtraining) occur with less significant impairment of oral hygiene than in non-athletes.

**Keywords:** athletes, oral health, periodontal diseases, oral hygiene index; caries; catarrhal gingivitis.

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## INTRODUCTION

Numerous studies have shown that dental diseases in athletes occupy a leading position in comparison with any others, and it will be explained, of course, by their greatest prevalence.<sup>[1,2]</sup> At the same time, in the conducted studies it is pointed out the extreme importance of the dental unit in the medical care system of athletes. As is known, intense physical activity leads to the growth of almost all dental diseases.

The main reason for the increase in the incidence of dental morbidity in athletes is exorbitant physical, incl. competitive as well as psycho-emotional overvoltages that suppress both local immunity of the cavity and general body reactivity.<sup>[6,7]</sup> This, in turn, is complicated by violation of protein and electrolyte metabolism, sideways metabolic acidosis with respiratory alkalosis. These reactions in combination with inhibition of immunity lead to an increase in the acidity of saliva, create conditions for demineralization of tooth enamel, increase the

microbial metabolism of the oral cavity, sensitize the body, reduce blood flow in the salivary glands due to its strengthening in working organs.<sup>[3,4]</sup> An important factor leading to growth dental morbidity in athletes,<sup>[1,7]</sup> is the predominance of oral respiration during the period of intensive training loads. A study conducted at RSUPES&T as part of a program to monitor the health of athletes revealed 380 athletes of various specializations aged 17–23 years with a 1587-year-old caries, which was 24%. The study included cyclical athletes, team sports and martial arts representatives. Caries-contact (aproximal) surfaces were mainly observed, and cervical caries was much less common. Virtually all stages were present: the staining stage, surface caries, medium caries, and deep caries. A number of factors affecting the development of caries in athletes, including diet, assessment of local dental protection, socio-economic factors and the role of traumatic dental lesions. There is a special negative effect of excessive physical exertion on periodontal tissues,<sup>[2,4]</sup> to the extent that, for athletes with no identified periodontal pathology, gingival bleeding was observed after intense training. The pathontal periodontium in athletes is more often represented by gingivitis and periodontitis, and it is most common for athletes engaged in water and winter

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sports, is the smallest among those involved in power and game types. It is interesting that almost no periodontal disease is present. Athletes. Apparently, it is explained by the young age of the athletes of the population. The absence of pain syndrome is often one of the features of the course of oral diseases in athletes, which leads to untimely rehabilitation of the oral cavity and chronic odontogenic foci. This type of damage often occurs asymptotically and leads to the emergence of not only periodontal disease, but also functional rational disturbances in the form of hypertonus of the chewing muscles of the maxillofacial region, dysfunction of the temporomandibular joint, increased abrasion of hard tissues of the teeth, the formation of sphenoid defects. In this regard, there is a need to enhance the role of prevention of basic dental diseases among athletes involved in cyclic sports, by developing a rational complex of measures and means aimed at improving the quality of life and the level of dental health in these category individuals.

Nowadays, it is proved that timely prevention of pathological conditions of the dental-maxillary system is capable of maintaining the quality of life and health. Based on the above, the purpose of this study was to assess the level of dental morbidity in athletes involved in cyclic sports, and to develop methods for its effective prevention.

## MATERIALS & METHODS

In the period from 2018 to 2019, a dental examination of 230 athletes of various levels of training, engaged in cyclic sports, was carried out in different periods of the training cycle, at the age of 18-25 years, the average duration of sports experience was  $5.7 \pm 1.12$  g.

At the beginning of the study, survey participants were surveyed using a specialized questionnaire, which resulted in analyzing information about acquired sports injuries in the maxillofacial area of athletes, hygiene of the RT cavity, and previous somatic diseases. In the subsequent studies, the dental status of the patients was determined. For this, the prevalence of the main dental diseases (caries and its complications), non-causal lesions, inflammatory diseases was studied.

Clinical dental examination was carried out according to generally accepted methods. The following clinical indices were used to study the initial changes in the paradont tissues in athletes and their dynamics: the oral hygiene index (IH) according to the method of Yu A Fedorov and VVolodkina V (1971), the WHO oral hygiene index (OHI) method Green and Vermel-hon (1960), papillary-marginal-alveolar index (RMA) in modification C Rapp (1960), periodontal index (PI), the intensity of damage to the hard tissues of the

teeth (KPU). Computer using Microsoft Excel and BioStat-2009.

## RESULTS & DISCUSSION

The results of a sociological study show that the majority of athletes are not sufficiently informed about the possibility of the occurrence of pathological processes in the dentofacial system.

Athletes are often subject to intense physical and psycho-emotional stress, which can result in overtraining syndrome - a phenomenon that affects not only the effectiveness of the training process, but also the health of the athlete as a whole. Also in the case of overtraining syndrome, electrolyte metabolism is disturbed in sports shifts, the number of energy substrates decreases, the body loses calcium, phosphorus, potassium, and especially fluorine salts, which prevents the development of a carious process. Thus, it can be concluded that, against the background of overtraining and incomplete dental health, both a decrease in its level and a deterioration in the quality of life of athletes can occur. In this situation, there is a need to develop a targeted comprehensive program for the prevention of major dental diseases in athletes.

According to the results of the questionnaire, it was found that 13.2% of athletes agree and 78.2% do not agree with the fact that the sport in which they do can adversely affect the state of the oral organs, 8.6% found it difficult to answer this question. 84.3% of athletes involved in cyclic sports, noted that they did not receive injuries of the maxillofacial area, 15.7% received.

The state of the oral cavity, the functional acid resistance of tooth enamel, the barrier function of the oral mucosa and the periodontal state of highly qualified athletes directly depend on the functional state of the whole organism and are secondary, not independent, as they depend on a number of endogenous and exogenous factors.

Saliva is a factor characterizing the functional state of an athlete when performing physical activities. According to our data, the pH of the oral fluid in the group of athletes is generally lower than in the control group.

(6.8 vs. 7.1). This condition is caused by intense muscular activity, where a large amount of lactic and pyruvic acids is formed, which, by diffusing into the blood, cause metabolic acidosis. The highest pH level was noted in rowers. This is accompanied by more frequent identification of multiple dental caries and chronic catarrhal gingivitis in these groups of athletes.

Analysis of the results of the research presented in the table, the frequency of occurrence of caries among rowers in canoes and canoes averages 79.2%. This indicator exceeds the frequency of occurrence of caries in the group of healthy individuals, i.e. among young people of the same age, but not

engaged in professional sports (47.7%). Meanwhile, among girls engaged in rowing and canoeing, the

prevalence of dental caries is 2 times more common than among boys.

**Table 1: The frequency of occurrence of dental diseases in athletes**

Type of sport	Caries	Gingivitis	Periodontitis	Fluorosis	Chronic aphthous stomatitis
paddling	79,2%	17,1%	25,2%	10,1%	19,9%
Control group	47,7%	9,9%	7,1%	4,9%	3,8%

According to many researchers, one of the causes of caries is oxidative stress induced by the lipopolysaccharide of pathogenic microbial flora. Oxidative damage caused by the action of the LPS microorganism worsens the processes of microcirculation, tissue oxygenation, and causes the development of hypoxia to cause enhanced expression of a number of cytokines, adhesion molecules, oxygenases and oxidative stress in effector cells. Based on the above, we believe that one of the factors in the pathogenesis of dental diseases and caries, in particular, is influenced by the environment and the microflora of the oral cavity at the time of training, which creates conditions for hypoxia and oxidative stress. It should be noted that during exercise, the resulting cytokines and oxidative stress occurring against the background of aeration with oxygen have a significant impact on the condition of the oral mucosa and creates a favorable condition for the development of caries.

**Table 2: Indicators of the dental status of athletes rowing and canoeing**

indicators	controls n=14	Canoeing sportsmens n=14
KPU (s)	5,07±0,54	3,64±0,77
KPU (p)	7,07±1,00	4,64±0,85
OHIS	1,19±0,11	1,24±0,15
PMA (%)	7,74±2,28	18,32±5,46
Saliva PH	6,93±0,03	6,67±0,08
SBI	0,84±0,13	1,28±0,15
IR %	0,50±1,24	-13,10±6,38
IEA	4,03±0,13	3,94±0,16
ICB	0,93±0,04	0,90±0,10

Rozanov N.N.<sup>[7]</sup> studying the dental status of representatives such a sport as rowing and canoeing, notes that the frequency and severity of dental diseases in highly skilled athletes is related to the direction of the training process, the functional state of the athlete's body, the level of nonspecific oral mucosa protection and the immunological reactivity of the athletes' body. Consequently, in the case of overtraining syndrome, there is a violation of the functions of both local nonspecific (lysozyme activity, pH) and immune protection of the athletes' mouth, which is one of the main causes of caries development.

A study of the dental status of an athlete rowing canoeing showed that the maximum PMA index,

reflecting the severity of gum inflammation, is also determined in rowers (18.32±5.46). An early sign of the development of catarrhal gingivitis and periodontitis is the appearance of bleeding gums, which is estimated by the SBI bleeding index. At the initial stage, it is detected even in the absence of other signs of the disease.

KPU (s) - the sum of carious (component "K"), filled (component "P") and removed (component "U") of the teeth of one examined

KPU (p) - the sum of all surfaces of the teeth diagnosed with caries and sealed at one person

OHIS - hygiene index

PMA - papillary-marginal-alveolar index

SBI - gingival bleeding index

IR - Kerdo index

IEA - an index of positive emotions

ICB - Hildebrand Index

High rates of caries were detected. Evaluation of the structure of the CPU (K - the number of carious, P - sealed, Y - extracted teeth) showed significant shortcomings in the organization of timely dental therapeutic care

In the process of collecting data on the dental status of athletes involved in cyclical sports, it was found that the average value of the KPU index is 3.64 ± 0.77, which corresponds to a high degree of damage to hard dental tissue by caries. When evaluating the index

OHIS -we obtained average data of 1.24 ± 0.15, which is an indicator of poor oral hygiene and the presence of hard and soft tooth deposits. When studying the nature of damage to hard dental tissues in athletes, it was found that the increased abrasion of teeth and wedge-shaped defects were found in 43% of the examined. %, corresponding to a satisfactory level of dental care.

The obtained data, which characterize the dental status of sports shifts, are the basis for the development of an effective program for the prevention of major dental diseases in sportsmen-athletes. The results of the research can be used in the daily practice of both dentists and sports doctors, as well as sports trainers and physical instructors who care about the health of their patients and who are seeking to improve their athletic performance.

**Findings**

Inflammatory periodontal diseases in athletes (including those in a state of overtraining) occur with less significant impairment of oral hygiene than in non-athletes.

## CONCLUSION

Inflammatory periodontal diseases in athletes (including those in a state of overtraining) occur with less significant impairment of oral hygiene than in non-athletes.

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