

Dental status of professional athletes

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Abstract

Aim. To reveal the rate and severity of clinical manifestations of common dental diseases and dentofacial anomalies in professional athletes

Methods. The effect of intense physical exertion and “overtraining syndrome” on the state of the organs and tissues of the dental system were examined in 200 professional athletes aged 18–25 years between 2014 and 2016. Five groups where each has the same number of athletes (n=40) included: team sport athletes (volleyball, handball), martial arts athletes (wrestling, boxing), gymnasts, swimmers, athletes. The control group consisted of 40 individuals who were not professionally involved in sports. The state of the oral cavity, in particular periodontal tissues, was judged by changes in the following indicators: prevalence of dentofacial anomalies, the incidence of dental caries, state of the oral cavity hygienic using by simplified oral hygiene index (OHI-S) (Green J.C., Vermillion J.R., 1963), degree of gums bleeding by using the Muhlemann–Cowell bleeding index, degrees of severity of periodontopathy by using the papillary-marginal alveolar index (RMA) [Massler, Schour (1949) in Parma modification (1960)].

Results. According to the values of the simplified oral hygiene index the worst state of the oral cavity hygienic was in wrestlers (2.12 ± 0.022 points) and boxers (2.03 ± 0.029) compared to the control group (1.62 ± 0.026 , $p=0.049$ and $p=0.001$, respectively). Catarrhal gingivitis and generalized chronic periodontitis are most often diagnosed in the groups of wrestling ($82.5 \pm 6.01\%$), gymnastics ($77.5 \pm 6.60\%$), boxing ($70.0 \pm 7.25\%$) and swimming ($70.0 \pm 7.25\%$). Dentoalveolar anomalies were more often detected in boxers (77.5% of cases, $p=0.001$) and in gymnasts (34.0% , $p=0.365$) compared to the control group. In these groups, diastema was also more often diagnosed.

Conclusion. Periodontal inflammation indicators were higher in wrestlers and gymnasts groups compared to the dental status of all other groups of athletes; caries and maximum level of dental anomalies are more common for boxers.

Keywords: athletes, anomalies, caries, periodontitis.

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Background

Intense and excessive physical exertion depletes the body of athletes, and the influence of severe psychoemotional disorders leads to a decrease in immunity and the development of various organ and system diseases [1-3]. When engaged in various sports, the influence of certain exogenous and endogenous factors on the state of soft and hard tissues of the mouth and the level of prevalence and intensity of major dental diseases in professional athletes have been established [4, 5]. Thus, against the background of long and exhausting training, especially in athletes engaged in power sports, dental anomalies are more common, and the prevalence and frequency of caries, noncarious lesions, teeth and maxillofacial region injuries, and inflammatory and destructive periodontal diseases are higher.

They are also diagnosed with locally associated pathological processes caused by the influence of odontogenic focus of chronic infection on systemic immunity [6, 7].

Stomatogenic odontogenic focus of athletes, insufficiently well-timed medical control of athletes' health in terms of timely and high-quality diagnostics, prevention and treatment of chronic infection focus and their role in reducing athletes' efficiency, and a lack of high sports achievements remain to be important and poorly studied areas of modern scientific and practical medicine [8, 9].

Thus, the relationship between the weakening of the body's defenses and the state of the oral organs of professional athletes may also be associated with metabolic imbalance, hemodynamics, and negative shifts in quantitative and qualitative indicators

of opportunistic and pathogenic microorganisms, which, along with the imbalance of the local and general resistance of the body, play an important role in the pathogenesis of major dental diseases, caries, and inflammatory periodontal diseases [10,11].

This study aimed to identify the frequency and severity of clinical aspects of major dental diseases and anomalies of professional athletes.

Material and methods

Two hundred professional athletes aged 18–25 years who were representatives of games and power sports were examined between 2014 and 2016 to study the state of the organs and tissues of the dental system. The groups with the same number of athletes (40 people each) included athletes specializing in game sports (volleyball and handball), martial arts (wrestling and boxing), gymnastics, and swimming. The control group consisted of 40 people of the same age and gender who went to a dental clinic and did not play sports professionally.

A complete clinical and instrumental dental examination and questionnaire were administered during planned preventive medical examinations at the bases of the Academy of Physical Culture and Sports and the Dental Clinic of the Azerbaijan Medical University. During the survey and anamnesis collection, we determined the presence and duration of clinical signs of inflammatory periodontal diseases and bleeding gum and its nature, the presence of caries and their complications, the nature and duration of pain, and the causes of halitosis and xerostomia.

During the examination, the frequency and types of dental anomalies and destruction and restoration of crowns and their quality were determined, and oral hygiene was evaluated, including the supradental and subdental intensities, hard and soft dental deposits, mucous membrane state, and periodontal pocket depth.

The state of the mouth, in particular the parodontium, was investigated by the dynamics of the following indicators: the prevalence of dentoalveolar anomalies, frequency of caries, use of the oral hygiene index (Green & Vermillion, 1963), degree of bleeding gums with the bleeding index according to Muhlemann–Cowell, and the severity of parodontopathy using the papillary-marginal-alveolar (PMA) index (Massler [1949] in the modification of Parma [1960]).

Statistical methods of the study included variational statistics methods (determination of average arithmetic value [M], average standard of an error [m], and Student's significance of the criterion [t]). Mann–Whitney criterion (*U*-test) was used to determine the reliability of differences when compa-

Table 1. Index evaluation of an oral health of athletes

Sport	HI (points)	PMA (%)	BI of Muhlemann–Cowell (points)
Game sports	1.62±0.026 p=0.001*	3.44±0.15 p=0.506	1.49±0.022 p=0.002*
Fighting	2.12±0.022 p=0.049*	4.53±0.20 p=0.001*	2.72±0.026 p=0.001*
Swimming	1.67±0.025 p=0.001*	3.78±0.11 p=0.10*	1.61±0.020 p=0.0346
Gymnastics	1.90±0.019 p=0.001*	4.36±0.18 p=0.001*	2.07±0.045 p=0.001*
Boxing	2.03±0.029 p=0.001*	3.89±0.16 p=0.008*	2.00±0.032 p=0.001*
Total	1.87±0.014 p=0.001*	4.00±0.13 p=0.001*	1.98±0.015 p=0.001*
Control	2.17±0.016	3.31±0.14	1.58±0.017

Note: The difference from the control is statistically significant ($p < 0.05$). HI, oral hygiene index; PMA, papillary-marginal-alveolar index; BI, bleeding index.

ring data from the main and control groups and the Wilcoxon criterion for the same indicator within the group. The differences were considered significant at $p \leq 0.05$ (Microsoft Excel and Statistica 7.0 for Windows).

Results and discussion

The research has studied the dental status of different sports representatives, and each of whom has a set of specific etiological factors (eating restrictions, low-calorie diet, dusty air in closed gyms, and injuries) that affects the state of body organs and systems, including the mouth.

The examined athletes have a high prevalence of the main dental diseases: caries and periodontitis of medium and severe degree. When comparing the dental status indicators of athletes, it was found that game sports representatives (1.62 ± 0.026 points, $p = 0.001$) have significantly lower indicators reflecting the intensity of plaque deposits in the cervical area than people who are not engaged in intensive training (2.17 ± 0.016 points). Also, the obtained index data indicate a worse state of oral hygiene for wrestlers (2.12 ± 0.022 points, $p = 0.049$) and boxers (2.03 ± 0.029 points, $p = 0.001$) than that for people engaged in other professional sports (Table 1).

The periodontal injury frequency and pathological change development of an inflammatory nature were also higher in the groups of power wrestlers as evidenced by the data of the PMA periodontal index.

Based on the conducted clinical studies, both swimmers and game sports representatives have

Table 2. Frequency of the detection of major dental diseases and dental system anomalies in representatives of different sports

Sport	Frequency of the detection of dental diseases					
	Caries		Dental anomalies		Periodontitis	
	n	%	n	%	n	%
Game sports	21	52.5±7.90	15	37.5±7.65	25	62.5±7.65
Fighting	24	60.0±7.75	12	30.0±7.25	33	82.5±6.01 p=0.015*
Swimming	24	60.0±7.75	13	32.5±7.41	28	70.0±7.25
Gymnastics	20	50.0±7.91	15	70.0±7.25	31	77.5±6.60
Boxing	25	62.5±7.65	28	37.5±7.65 p=0.001*	28	70.0±7.25
Total	114	57.0±3.50	83	41.5±3.48 p=0.024*	145	72.5±3.16
Control	18	45.0±7.87	9	22.5±6.60	23	57.5±7.82

Note: The difference from the control is statistically significant ($p < 0.05$).

a relatively better state of dental health than other sports representatives. Significant differences were found in the index assessment of the damage level of soft parotid tissues (that is, according to PMA and bleeding indexes of Muhlemann–Cowell) between the groups of athletes engaged in high-performance sports and the control group of practically healthy people who do not play sports professionally. Because wrestling and boxing are sports that require endurance development against the background of intense power loads, the influence of aggressive environmental factors in closed and dusty rooms and the frequency of traumatic injuries in the maxillofacial area may be the reason for the high bleeding gums frequency and high PMA and bleeding indexes in these groups of professional athletes.

In the group of professional athletes, the intensity of periodontal inflammation is more pertinent for wrestlers. Thus, the PMA index in this group was $4.53\% \pm 0.20\%$ and in the control group $3.31\% \pm 0.14\%$ ($p < 0.05$). When considering the groups, it was found that the lower degree of intensity in pathological changes of periodontal disease was registered in the control group of practically healthy people who are not engaged in professional sports. The average level of the PMA index was relatively low in the control group ($3.31\% \pm 0.14\%$) than in the athlete group engaged in game sports ($3.44\% \pm 0.15\%$, $p = 0.506$).

When analyzing the bleeding index, it was found that in all groups of examined athletes, a higher level of bleeding gum was generally observed than that in the control group. So, if the index of the studied wrestlers was 2.72 ± 0.026 points, then the values in the control group were 1.58 ± 0.017 points ($p < 0.05$). The greatest bleeding was observed for

athletes engaged in wrestling, boxing, and gymnastics. The minimum level of bleeding was found in game sports representatives.

The results of the index assessment of the periodontal condition showed that the incidence of catarrhal gingivitis and mild periodontitis differed from the data of the control group ($57.5\% \pm 7.82\%$) to a lesser extent than the indicators for other groups of athletes in professional sports ($62.5\% \pm 7.65\%$) and swimming ($70.0\% \pm 7.25\%$).

In the conducted clinical studies, it was found that the frequency of caries of professional athletes is higher than that of the control group (Table 2). In the control group, the proportion of patients with caries was $45.0\% \pm 7.87\%$. Among athletes, the most successful groups were gymnasts and game sports representatives, where caries was diagnosed in an average of $50.0\% \pm 7.91\%$ and $52.5\% \pm 7.90\%$, respectively. The greatest intensity of caries was found for martial arts athletes.

We have considered such indicators as the presence of chronic focus of infection of an inflammatory and destructive nature in the periodontium of different sports representatives, since such serious pathological changes in the oral cavity against the background of a decrease in the body's defenses can lead to serious consequences. Catarrhal gingivitis and chronic generalized periodontitis were most common for sports such as wrestling ($82.5\% \pm 6.01\%$), gymnastics ($77.5\% \pm 6.60\%$), and boxing and swimming ($70.0\% \pm 7.25\%$). It should be noted that professional boxers had inflammatory periodontal diseases that were observed more often ($p = 0.001$) than the control group with a frequency of only $57.5\% \pm 7.82\%$.

In the group of athletes, dental anomalies, as in the case of various forms of periodontal di-

Table 3. The presence of diastemas in the examined groups of sportsmen

Tremas	Boxing	Wrestling	Volleyball	Swimming	Gymnastics	Control
Presence, %	77.5	32.5	21.3	14.0	34.0	25.0
Absence, %	22.5	67.5	78.7	86.0	66.0	75.0
p	0.001*	0.515	0.708	0.200	0.365	—

Note: The difference from the control is statistically significant ($p < 0.05$).

Table 4. Data for teeth crowding in the study groups

Crowding	Wrestling	Volleyball	Swimming	Gymnastics	Boxing	Control
Presence, %	20.0	16.0	48.8	83.8	55.0	42.0
Absence, %	80.0	84.0	51.2	16.2	45.0	58.0
p	0.046*	0.008*	0.568	0.001*	0.310	—

Note: The difference from the control is statistically significant ($p < 0.05$).

sease, were registered more often than in the control group. In our opinion, this may be due to the start of sports and intensity of physical and psychoemotional stress at an early age. Moreover, with the development of severe forms of inflammatory periodontal diseases due to deep pathological changes and disorders in the dentoalveolar apparatus (index assessment), teeth are displaced resulting in an increased frequency of teeth crowding and diastemas (Tables 3 and 4). Our results show that mainly dental anomalies were detected for boxers (77.5%) and gymnasts (34.0%), and diastema was diagnosed in these groups, which determine the need for regular mouth examinations in the first place for the abovementioned sports representatives.

Early start of professional sports activity (e.g., in gymnasts) and extreme and prolonged physical loads on muscles and joints form a motor stereotype, which determines the conditions for the development of the musculoskeletal and dental systems, and can lead to multiple disbalances in the position of the teeth and the formation of the bite of the teeth. Thus, the degree of severity of pathological changes in the tissues and organs of the oral cavity is largely due to the specifics of the training process and the presence of pathogenic factors that are inherent in certain sports.

It can be concluded that a high level of prevalence of inflammatory periodontal diseases and caries falls on all groups of professional athletes representatives of the studied sports. Studying the dental status of people engaged in professional sports revealed the fact that periodontitis and dental caries were more commonly found in the comparison group than in the control group. Wrestlers and gymnasts are at risk of developing inflammatory periodontal diseases. Martial arts representatives have low oral hygiene and pro-

nounced inflammatory processes in periodontal tissues. Meanwhile, gymnastics and boxing representatives more often recorded the development of dental anomalies, such as diastema and teeth crowding.

Conclusions

1. Comparing the criteria of dental status of wrestlers and gymnasts, indicators reflecting periodontal inflammation were higher than that of other athletes groups and the control group.

2. Caries was more common for boxers who also had the highest level of dental anomalies among the compared groups.

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