


COMPREHENSIVE REVIEW

A suggested universal protocol for dental examination in sports

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Abstract

The athletes of any sport and level submit their bodies to constant exercise. Any given pathology can increase the risk of injury, illness, or even reduced performance. The medical examination is valuable in diagnosing existing health problems and preventing medical issues that might compromise the athlete's overall health when exercising. The stomatognathic system is not an exemption, as oral pathologies, including dental caries and periodontal diseases, are found in high incidence in sports. The need for accurate and detailed dental examination in sports led dentists from the European Association for Sports Dentistry and the Academy for Sports Dentistry to elaborate a universal dental examination in sports protocol that can record the overall oral health of the athlete, including the teeth, periodontium, and musculoskeletal screening, for all athletes. The outcome of this stomatognathic examination allows sports physicians and professionals other than dentists to have a complete image of the individual oral health condition of any given athlete, and it allows the dentists to efficiently screen and prevent pathologies, as well as to advise on the eligibility to practice sports from the oral health perspective.

KEYWORDS

athletes, oral health problems, screening examination protocol, sports dentistry

1 | INTRODUCTION

Sports medicine contributes to healthier athletes and better performance and, in recent years, has evolved into a multidisciplinary field that recognizes sports dentistry as an essential element.^{1,2}

Sports Dentistry is the branch of dentistry dealing with the prevention and treatment of the pathologies and injuries of the oral cavity and the stomatognathic system related to sports practice.³ According to the World Health Organization, oral health is an

integral part of health, wellness, and quality of life and is a fundamental human right.⁴

Previous studies have shown that athletes' oral health is poor. Based on a systematic review, 15%–75% presented dental caries, 35%–85% erosion, and 0%–15% periodontal problems.^{5,6}

One of the reasons for the appearance of this high prevalence can be attributed to the diet and habits of athletes. Athletes regularly use sports, energy drinks, and carbohydrate-rich nutrients in drinks or gels during training and competition. At the same time,

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dehydration and stress caused during sports activity aggravate the effect of carbohydrates and acidic components on the dental hard tissues, reducing the protective effect of saliva.⁷

Moreover, during their activity, athletes have an increased risk of injuries to the head and mouth, especially in contact sports and martial arts.⁸ Therefore, a key component in preventing these conditions is identifying individual risk factors, pertinent information, and guidance of athletes by the dentist.

Finally, individual attitudes, behaviors, and culture toward oral health are crucial parameters for achieving oral health. Unfortunately, studies have shown that athletes' knowledge of the value of oral health and risk assessment needs to be improved.⁹ At the same time, the percentage of athletes who make regular dental visits is insignificant.

Oral health is essential for athletic performance. Poor oral hygiene and the appearance of oral diseases can cause systemic inflammation and adversely affect athletic performance. At the same time, pain, pulpitis, and inability to chew negatively affect the athlete's quality of life. Although it has yet to be fully recorded how many hours of training athletes lose during the season to deal with dental problems, the latter has a high cost on performance.

Regular oral health assessments by a dental professional, especially during the preseason, will allow for individualizing prevention plans and early treatment of any disease. National sports funders and policy organizations should take the lead in integrating such an approach. For example, the World Dental Federation (FDI) has issued the official oral health, and sports guidelines and toolkit addressed to the international community of dentists, physicians, athletes, and sports federations.¹⁰⁻¹³ Another example is the International Olympic Committee prioritizes protecting the athlete's health, and the international sporting bodies advocate a holistic approach to ensuring athlete well-being and performance.¹⁴

For the reasons mentioned above, the European Association for Sports Dentistry (EA4SD) and the Academy for Sports Dentistry (ASD) have created a working group to develop a Universal Screening Protocol for Dental Examinations in Sports (USPDES). This working group comprises universities, hospitals, and private practitioners from several countries with solid professional experience in sports dentistry. The athletes should submit a protocol for the dental examination before starting sports activities.

2 | THE UNIVERSAL DENTAL EXAMINATION IN SPORTS PROTOCOL

This paper results from the working group's efforts of several dentists and all members of sports dentistry associations from different countries worldwide. In the first step, the working group set the dental screening examination protocol goals.

These goals were,

1. The protocol to be short.
2. To allow collecting a maximum of data about the overall health status of the stomatognathic system as well as to provide a shorter and faster to fill version.

3. Include basic information about the dental condition that will benefit the athlete and team.
4. To adopt the instructions and codification of the FDI.

This group commenced by listing potentially relevant topics. Next, three representatives prepared a draft protocol and presented it to the workshop plenary to obtain feedback. Finally, a list of core items was obtained for the present paper. The intensive discussions of this working group revealed a unanimous agreement about the chances and methods to be applied for this specific type of examination protocol. Still, they also revealed several difficulties and challenges hindering this application into "real life" clinical practice.

The examination protocol form is shown in [Figures 1 and 2](#).

The green areas are the mandatory ones for filling. The rest of the areas are optional and will be filled if the dentist has enough time or the necessary equipment and place to fill them. The screening examination protocol's rationale was to have those two options (mandatory and nonmandatory) so that they could be applied universally. Additionally, the dental examination must often be performed on all the sports team members in the sports areas where there is neither the appropriate equipment nor the available time.

The first section of the examination form contains general personal and sports information ([Figure 3](#)). The athlete should fill it out, and it is mandatory.

The second section contains information on dental history ([Figure 4](#)). Again, the athlete should fill it out, and it is mandatory. Its content and structure aim to collect important epidemiological data and reveal the athletes' awareness of their oral health regarding their past dental treatments and habits. Additionally, the OHIP-5 questionnaire can be an epidemiological tool showcasing the impact of the athletes' oral health on their life, well-being, and physical exercise.

The third section includes the teeth examination ([Figure 5](#)). The dentist records caries and non-carious dental tissue lesions, measure the teeth for vitality, and proper tests for the periapical tissues. Finally, the dentist calculates the decayed, missing, and filled teeth (DMFT) index. The mandatory fields are the percussion test and the calculation of DMFT. The positive responses to the percussion test indicate inflammation of the periodontal ligament. The thermal test is used to detect the vitality of the tooth in question. Tooth and pulp testing can be done during almost any appointment to address the athlete's pain or discomfort. The thermal test, especially the cold, has good validity in distinguishing a vital pulp from a non-vital pulp, correctly identifying a large proportion of both the non-vital and vital pulps.¹⁵

On the other hand, the percussion test is a simple but beneficial examination method used to ascertain an inflammatory condition in a tooth's radicular area. It is crucial to detect these conditions early in athletes, minimizing thus the risk of developing a periodontal and periapical abscess.

For caries detection, we used the International Caries Detection and Assessment system (ICDAS) optical clinical criteria. A tooth structure's surface and optical characteristics determine the ICDAS

UNIVERSAL DENTAL EXAMINATION IN SPORTS

DATE, CITY _____ EXAMINING DENTIST _____

1. GENERAL INFORMATION (filled by athlete)

FIRST NAME _____ LAST NAME _____ SEX M/F BIRTH DATE ___/___/___ WEIGHT ___ HEIGHT ___
 ADDRESS _____ (street) _____ (number) _____ (city) _____ (PC) _____ (country)
 PHONE NUMBER _____ email _____ SPORT _____ YEARS OF EXPERIENCE _____
 CURRENT TEAM _____ COUNTRY _____ DOCTOR _____ DENTIST _____

2. DENTAL HISTORY (filled by athlete)

Last visit to Dentist: 0-6 months ___ 6-12 months ___ >1 year ___ **Dental checkups frequency:** 1/year ___ 2 or more/year ___ <1 year ___
Past dental treatments: fillings ___ root canal ___ extraction ___ prosthetics ___ surgery ___ implant ___ periodontal ___
 dentures ___ orthodontic ___ year completed ___
Allergies/intolerance to medications: yes / no medication: _____
Have you ever experienced: jaw injury Yes / no specify: _____
Diet: sodas, lollipops, sports drinks (number per day) ___, Smoking/chew tobacco (times per day) ___ Alcohol drinks per day ___
MOUTHGUARDS: yes / no type: custom made ___ prefabricated ___ boil & bite ___ occlusal splint: yes / no
 Do you wear one: always sometimes never

How often you had the following problem during the last month?	Very often	Fairly often	Occasionally	Hardly ever	Never
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaws?					
Have you had painful aching in your mouth?					
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?					
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?					
Have you had difficulty doing your usual jobs because of problems with your teeth, mouth, dentures, or jaws?					

3. INITIAL DENTAL EXAMINATION (filled by dentist)

																	OVERALL SCORE	
Negative on Temperature																		
Positive on Percussion																		
Positive on Pressure																		
Demineralization																		
Erosion																		
Abrasion																		
Attrition																		
ICDAS (0 to 6)																		
Eden-Baysal Dental Trauma Index																		
DMFT (Decayed-Missing-Filled Teeth Index)																		

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

																	OVERALL SCORE	
Negative on Temperature																		
Positive on Percussion																		
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Demineralization																		
Erosion																		
Abrasion																		
Attrition																		
ICDAS (0 to 6)																		
Eden-Baysal Dental Trauma Index																		
DMFT (Decayed-Missing-Filled Teeth Index)																		

OVERALL SCORE _____

Chart symbols to be filled on each tooth in presence of: filled teeth (*), missing teeth (x), devitalized teeth (I), infectious teeth (abscess O), crowned teeth (prosthetics U), cracked teeth (/)

CONFIDENTIAL QUESTIONNAIRE

FIGURE 1 Universal Dental Examination in Sports Protocol, page 1.

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4. PERIODONTAL SCREENING (filled by dentist)

4. PERIODONTAL SCREENING (filled by dentist)																		OVERALL SCORE
BOP (yes/no)																		
PI <small>Outley & Hein Plaque Index score 0 to 3</small>																		
GI <small>Loe & Silness Gingival Index score from 0 to 3</small>																		
Recession																		
Mobility																		
CAL (mm)																		
PPD (mm)																		
	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28		
	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38		
PPD (mm)																		
CAL (mm)																		
Mobility																		
Recession																		
GI																		
PI																		
BOP (yes/no)																		
																		OVERALL SCORE

Oral Cancer Screen	Normal	Abnormal	Notes
Palate			
Lips			
Tongue			
Throat/neck			
Cheeks			

Floor of mouth	Normal	Abnormal	Notes
Fraenum			
Saliva	pH:		Flow: ml/min
Diagnosis	P	G	Periodontitis (P) / Gingivitis (G)

5. MUSCULOSKELETAL SCREENING (filled by dentist)

Reported pain in the face and/or temples: yes / no, **TMJ noise:** yes / no, **Mandibular movement limitations:** yes / no, **Pain on muscle palpation:** yes / no, **Pain on TMJ palpation:** yes / no
 Functional analysis ___ Asymmetry ___ Opening/Closing of the mouth ___ Deviation (mm) ___

Limited movement				Locking				Muscles								
	mm	Deviation			R	L			Pain		Tension					
Overbite		R	L	Clicking	R	L			Masseter superficial	R	L	R	L			
Max mouth opening		R	L	Crepitus	R	L			Masseter deep	R	L	R	L			
Right laterotrusion		R	L	Compression	R	L			Temporalis anterior	R	L	R	L			
Left laterotrusion		R	L	Endfeel	R	L			Pterygoid lateral	R	L	R	L			
Protrusion		R	L	Deviation				Trapezius muscles	R	L	R	L				
Retrusion		R	L	20	20			Digastric	R	L	R	L				
Palpation/TMJ				R	L			Sternocleidomastoid	R	L	R	L				
Pain lateral		R	L	40	40			Counter-resistance opening	R	L	R	L				
Pain posterior		R	L	60	60			Counter-resistance anterior	R	L	R	L				
Pain intra-meatal		R	L					Counter-resistance lateral	R	L	R	L				

RADIOGRAPHIC EXAM TAKEN (attached as annexed): panoramic ___ bitewing ___ other ___ **OCCLUSAL RECORD TAKEN:** yes / no
ORTHODONTIC EXAM: Angle's Class: ___ **Headaches present:** yes / no - morning / nocturnal / during exercise

6. PARALYMPIC ATHLETES (filled by dentist)

Disability: Physical ___ Sensorial ___ Intellectual ___ First appearance: ___ (date)
Causes: Genetic ___ Congenital ___ Trauma ___ Disease ___ Degenerative ___ **Activity/sport before disability:** ___
 Disease: ___ Medications: ___ Rehabilitation: yes / no

7. SPORTS DENTAL SCREENING PROTOCOL OUTCOME

ATHLETE IS IN GROUP: GREEN YELLOW RED
 (according to the FDI guidelines: Green/no pathological and/or functional findings, Yellow/presence of at least one pathological or functional finding, Red/multiple severe pathological and/or functional findings)

ELIGIBILITY TO PRACTICE SPORTS: YES / NO

CONFIDENTIAL QUESTIONNAIRE

FIGURE 2 Universal Dental Examination in Sports Protocol, page 2.

1. GENERAL INFORMATION (filled by athlete)					
FIRST NAME _____	LAST NAME _____	SEX M/F _____	BIRTH DATE ___/___/___	WEIGHT _____	HEIGHT _____
ADDRESS _____ (street) _____ (number) _____ (city) _____ (PC) _____ (country)					
PHONE NUMBER _____	email _____	SPORT _____		YEARS OF EXPERIENCE _____	
CURRENT TEAM _____	COUNTRY _____	DOCTOR _____	DENTIST _____		

FIGURE 3 The general information section.

2. DENTAL HISTORY (filled by athlete)					
Last visit to Dentist: 0-6 months ___ 6-12 months ___ >1 year ___ Dental checkups frequency: 1/year ___ 2 or more/year ___ <1 year ___					
Past dental treatments: fillings ___ root canal ___ extraction ___ prosthetics ___ surgery ___ implant ___ periodontal ___ dentures ___ orthodontic ___ year completed ___					
Allergies/intolerance to medications: yes / no medication: _____					
Have you ever experienced: jaw injury Yes / no specify: _____					
Diet: sodas, lollipops, sports drinks (number per day) ____, Smoking/chew tobacco (times per day) ____, Alcohol drinks per day ___					
MOUTHGUARDS: yes / no type: custom made ___ prefabricated ___ boil & bite ___ occlusal splint: yes / no					
Do you wear one: always ___ sometimes ___ never ___					
How often you had the following problem during the last month?	Very often	Fairly often	Occasionally	Hardly ever	Never
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaws?					
Have you had painful aching in your mouth?					
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?					
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?					
Have you had difficulty doing your usual jobs because of problems with your teeth, mouth, dentures, or jaws?					

FIGURE 4 The dental history section.

measurements of the potential histological depth of the carious lesions. ICDAS is a simple, logical, and an evidence-based system for detecting and classifying caries in dental public health.¹⁶ We used the merged criteria coding 0, A, B, and C. Code 0 indicates sound tooth surfaces show no evidence of visible caries (no or questionable change in enamel translucency). Code A indicates initial-stage caries. First or distinct visual changes in enamel are seen as a carious opacity or visible discoloration (white spot lesion and brown carious discoloration). They show no evidence of surface breakdown or underlying dentin shadowing. Code B indicates moderate-stage caries. A white or brown spot lesion with localized enamel breakdown, without visible dentin exposure, or an underlying dentin shadow originated on the surface being evaluated. Code C indicates extensive-stage caries—a distinct cavity in opaque or discolored enamel with visible dentin.

The DMFT index is one of the most common methods in oral epidemiology for assessing dental caries prevalence and dental treatment needs among populations.¹⁶ It is crucial to calculate this index because it shows a person's or group's caries history, especially the athletes. Therefore, we measured the code B and C ICDAS criteria (D3 threshold) to calculate the D parameter. This form uses the Eden Baysal Dental Trauma Index (EBDTI) for recording tooth trauma.¹⁷ This index is simple to use in emergencies and facilitates later data processing. Also, it gives the possibility to record several different clinical scenarios. By correctly diagnosing the affected tissues, adequate treatment can be chosen according to the guidelines of the International Association of Dental Traumatology and the Dental

Trauma Guide from alternatives already in the emergency situation. Moreover, the index is suitable for electronic data collection and provides easy handling.^{18,19} Previous studies showed that this index was successfully validated for face and content. The Eden Baysal Dental Trauma Index is a five-digit index that defines the type of injury of the dental hard tissues (crown in relation to the pulp and root), periodontal ligament, and alveolar process, and it also records the maturity of the root apex. The FDI tooth code should be used in parentheses to indicate the injured tooth. The first digit after the FDI tooth code stands for hard dental tissue injuries affecting the crown with information on its relationship to the pulp and root (0=none, 1=enamel fracture, 2=enamel and dentin fracture=uncomplicated crown fracture, 3=enamel and dentin fracture including the pulp=complicated crown fracture, 4=enamel-dentin-cementum fracture=uncomplicated crown-root fracture, 5=enamel-dentin-cementum fracture including the pulp=complicated crown-root fracture). The second digit stands for hard dental tissue injury of the root indicating the location of the fracture line (0=none, 1=apical one-third root fracture, 2=middle one-third root fracture, 3=cervical one-third root fracture). The third digit stands for periodontal ligament injury. The type of the periodontal ligament injury that is present is indicated by its first letter written in capitals (N=none, C=concussion, S=subluxation, E=extrusive luxation, L=lateral luxation, I=intrusive luxation, A=avulsion). The fourth digit stands for the maturity of the apex. Lower case first letters of the words defining the characteristics of the apex are used (i=immature apex, m=mature apex, r=resorbed apex). The fifth digit indicates

the type. Temporomandibular disorder (TMD) is a collective term for structural and functional diseases involving the temporomandibular joint and masticatory muscles, head and neck muscles, and contiguous tissue components.²² Biological, anatomical, biomechanical, behavioral, environmental, and emotional factors influence the masticatory system, contributing to the development of signs and symptoms of TMD, which, however, are considered a multifactorial pathology characterized mainly by pain and reduced movement of the jaw.²³

Functional changes in the masticatory muscles are the most frequent patient reports. As the alterations of the masticatory muscles resolve relatively quickly, they are considered acute myalgic forms.²³

Dysfunctions of the temporomandibular joints are the most frequent findings upon examination of a patient with dysfunctions of the chewing system. Some of these do not cause pain and can be misalignment of the condyle-disc complex, structural incompatibility of the articular surfaces, or articular inflammatory changes.

A group of basic and clinical pain sciences experts modified the revised Axis I Research Diagnostic Criteria for Temporomandibular Disorders RDC/TMD algorithms by conducting in-depth searches of the diagnostic literature, followed by review and consensus through a formal structured process.²⁴ The Committee's recommendations for further revision of the Axis I diagnostic algorithms were assessed for validity using the validation project dataset and for reliability using newly collected data as part of the ongoing ATM Impacts project.

The Axis I diagnostic criteria protocol for TMD (RDC/TMD) includes both a valid scheme to detect any pain-related TMD and valid diagnostic criteria to differentiate the most common pain-related TMD (sensitivity ≥ 0.86 , specificity ≥ 0.98) and for an intra-articular disorder (sensitivity 0.80 and specificity 0.97). Diagnostic criteria for other common intra-articular diseases are not valid enough for clinical diagnosis but can be used for screening.

The section of the folder relating to functional screening is a compact and essential version of the diagnostic criteria, relating to

Axis I, aimed at detecting the main factors of nonphysiological function and directing to an in-depth diagnostic study.

The sixth section includes information about paralympic athletes. Again, the dentist fills this section. (Figure 8).

The seventh section refers to the conclusion from all the examinations and the final judgment on oral-facial conditions (Figure 9). We follow the guidelines of FDI and classify the athletes into three categories.¹⁰⁻¹³ The first category is green. The athlete presents no pathological or functional findings. The second category is yellow. The athlete presents at least one pathological or functional finding; the last category is red.⁹ That means the athlete presents multiple severe pathological and functional findings. One of the innovations this protocol introduces is that the dentist completing this examination can decide upon the athlete's eligibility to practice sports based on the objective findings and the overall oral health. This section is mandatory.

3 | DISCUSSION

European Association for Sports Dentistry and Academy for Sports Dentistry are firmly committed to developing sports dentistry and its integration into sports medicine as they have decided to sign the European Association for Sports Dentistry and Academy for Sports Dentistry Memorandum of Understanding (MoU) in 2019.² Until now, there was no standard system for examining and recording athletes' dental problems. While the sports examination is integral to the athlete's participation in sports activities unreservedly, the same is not the case with the dental examination. A well-known example of a medical examination of athletes in sports is Pre-Competition Medical Assessment (PCMA), created by the Federation Internationale des Federations du Football (FIFA).²⁵ The sports dentistry examination protocol aims to create standard conditions for the dental examination of athletes to be part of the general medical examination. Its philosophy is to provide a simple, fast, and easy way to complete

6. PARALYMPIC ATHLETES (filled by dentist)							
Disability: Physical ___ Sensorial ___ Intellectual ___ First appearance: _____ (date)							
Causes: Genetic ___ Congenital ___ Trauma ___ Disease ___ Degenerative ___				Activity/sport before disability: _____			
Appendage function	Right	Normal	Reduced	Absent	Normal	Reduced	Absent
	Left	Normal	Reduced	Absent	Normal	Reduced	Absent
Disease: _____				Medications: _____		Rehabilitation: yes / no	

FIGURE 8 The section for paralympic athletes' information.

7. SPORTS DENTAL SCREENING PROTOCOL OUTCOME		
ATHLETE IS IN GROUP: GREEN YELLOW RED		
<i>(according to the FDI guidelines: Green/no pathological and/or functional findings, Yellow/presence of at least one pathological or functional finding, Red/multiple severe pathological and/or functional findings)</i>		
ELIGIBILITY TO PRACTICE SPORTS: YES / NO		

FIGURE 9 The sports dental screening protocol outcome section.

mandatory fields without special medical equipment. At the same time, however, it allows for a more detailed examination when conditions, time, and specialized equipment allow it.

It also records the main dental conditions and diseases that may, in the future, pose obstacles to the exercise of sports activities. In addition, the goal was to be a standard form for all dentists involved in sports dentistry. For example, if an athlete is currently on a team in one country and goes to another team in another country, this dental protocol will follow, and there will be a common ground.

Another goal of creating this examination protocol is to record the existing dental problems of athletes, inform and raise their awareness, motivate them, and develop individualized preventive and therapeutic protocols. Therefore, after examining the athletes and their final ranking based on their problems and needs, the next step is to design appropriate preventive programs that will be applied according to the athlete's oral-facial situation ranking. Oral diseases such as caries, tooth wear, and periodontal diseases do not present with severe pain in their early stages, and athletes continue to train and compete, even with symptoms.²⁶ On the other side, it is crucial to establish appropriate services to manage athletes' oral health continuously and not only during significant competitions.

The short extent of this protocol in two pages can be ideal for integrating it into sports medicine examination protocols as an annex. The examination is done by the simple answer to questions, in majority yes or no, filling numbers (digits), and overall scores in numbers (digits) that make it easy to establish an overall oral health score. This, in turn, can be easily interpreted by non-dentists in sports, such as sports physicians and physiotherapists, to understand the oral health condition of the athlete.

It is now desirable to integrate sports dentistry into the sports medicine multidisciplinary field. Sports dentistry has recently been recognized as a new field in dentistry by the FDI. There is a complex two-way interaction between oral health and sports activities.²⁷ Oral diseases can influence physical exercise outcomes, risk of injury, and performance. Conversely, physical exercise is a risk factor for initiating or aggravating oral diseases because of stress, diet, salivary flow, absence of oral health prevention, and protection against orofacial injuries.

Screening/early recognition of the disease is well-established in health care. Therefore, there is a pressing need for early dental screening examination of athletes to promote oral health and prevention and raise awareness of oral health's importance in sports within the athletic community, health professionals, sports federations, and medical centers.

AUTHOR CONTRIBUTIONS

Conceptualization, AS, MD, CR; methodology, all authors; software, AS, CR; formal analysis, all authors; data curation, all authors; writing—original draft preparation, AS, MD, CR; writing—review and editing, all authors; supervision, AS, CR; All authors have read and agreed to the published version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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REFERENCES

- Dvorak J, Junge A. Twenty years of the FIFA medical assessment and research Centre: from 'medicine for football' to 'football for health'. *Br J Sports Med*. 2015;49:561–3.
- Stamos A, Mills S, Malliaropoulos N, Cantamessa S, Dartevelle JL, Gündüz E, et al. The European Association for Sports Dentistry, academy for sports dentistry, European College of Sports and Exercise Physicians consensus statement on sports dentistry integration in sports medicine. *Dent Traumatol*. 2020;36:680–4.
- FDI statement. Sports Dentistry. Available from: <https://www.fdiworlddental.org/sports-dentistry-0>
- WHO Global Oral Health Status Report 2022. Available from: <https://www.who.int/publications/i/item/9789240061484>
- Ashley P, Di Iorio A, Cole E, Tanday A, Needleman I. Oral health of elite athletes and association with performance: a systematic review. *Br J Sports Med*. 2015;49:14–9.
- Needleman I, Ashley P, Fine P, Haddad F, Loosemore M, de Medici A, et al. Oral health and elite sport performance. *Br J Sports Med*. 2015;49:3–6.
- Ntovas P, Loumprinis N, Maniatakos P, Margaritidi L, Rahiotis C. The effects of physical exercise on saliva composition: a comprehensive review. *Dent J (Basel)*. 2022;10:7.
- Polmann H, Melo G, Conti Réus J, Domingos FL, de Souza BDM, Padilha AC, et al. Prevalence of dentofacial injuries among combat sports practitioners: a systematic review and meta-analysis. *Dent Traumatol*. 2020;36(2):124–40.
- Needleman I, Ashley P, Fine P, Haddad F, Loosemore M, de Medici A, et al. Consensus statement: Oral health and elite sport performance. *Br Dent J*. 2014;217:587–90.
- FDI. Guidelines for Dentists. Available from: <https://www.fdiworlddental.org/guidelines-dentists-and-sports-medicine-physicians>
- FDI. Guidelines for Amateurs Athletes. Available from: <https://www.fdiworlddental.org/guidelines-amateurs>
- FDI. Guidelines for Elite Athletes. Available from: <https://www.fdiworlddental.org/guidelines-elite-athletes>
- FDI. Toolkit for Sports Organizations. Available from: <https://www.fdiworlddental.org/toolkit-sports-organizations>
- Matheson GO, Klügl M, Engebretsen L, Bendiksen F, Blair SN, Börjesson M, et al. Prevention and management of non-communicable disease: the IOC consensus statement, Lausanne 2013. *Br J Sports Med*. 2013;47:1003–11.
- Alghaithy RA, Qualtrough AJ. Pulp sensibility and vitality tests for diagnosing pulpal health in permanent teeth: a critical review. *Int Endod J*. 2017;50:135–42.
- Ismail AI, Sohn W, Tellez M, Amaya A, Sen A, Hasson H, et al. The international caries detection and assessment system (ICDAS): an integrated system for measuring dental caries. *Community Dent Oral Epidemiol*. 2007;35(3):170–8.

17. Eden E, Baysal M, Andersson L. Eden Baysal dental trauma index: face and content validation. *Dent Traumatol.* 2020;36(2):117–23.
18. Eden E, Buldur B, Duruk G, Ezberci S. Web-based dental trauma database using Eden Baysal dental trauma index: a Turkish multi-center study. *Eur Oral Res.* 2021;55(1):21–7.
19. Eden E, Onetto JE, O'Connell AC. Extension of a novel diagnostic index to include soft tissue injuries: modified Eden Baysal dental trauma index. *Dent Traumatol.* 2021;37(6):749–57.
20. Pappa E, Vastardis H, Rahiotis C. Chair-side saliva diagnostic tests: an evaluation tool for xerostomia and caries risk assessment in children with type 1 diabetes. *J Dent.* 2020;93:103224.
21. Gangloff P, Louis JP, Perrin PP. Dental occlusion modifies gaze and posture stabilization in human subjects. *Neurosci Lett.* 2000;293:203–6.
22. Okeson JP. *Orofacial pain: Guidelines for assessment, diagnosis and management.* 1st ed. Chicago: Quintessence Publishing Co; 1996. p. 113–84.
23. De Leeuw R. *American Academy of orofacial pain: guidelines for assessment, diagnosis, and management.* Fourth ed. Chicago: Quintessence Publishing; 2008. p. 131–41.
24. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the international RDC/TMD consortium network* and orofacial pain special interest group†. *J Oral Facial Pain Headache.* 2014;28:6–27.
25. FIFA. Pre-competition medical assessment (PCMA). Available from: <https://digitalhub.fifa.com/m/61fa7fb894f9126d/original/rs6yecfr0nyarjshaxyd-pdf.pdf>
26. Gallagher J, Fine P, Ashley P, Needleman I. Developing the role of the sports dentist. *Br Dent J.* 2021;231:544–6.
27. Hall MM, Bernhardt DT, Finnoff JT, Hoffman DF, Hrubes MR, Mautner KR, et al. American medical Society for Sports Medicine Sports Ultrasound Curriculum for sports medicine fellowships. *Clin J Sport Med.* 2021;31:176–e187.

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