

The Role of Sports Dentists in the Oral Health of Athletes: The Effects of Nutrition, Prevention, and Education on Oral Health and Performance

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An apple a day keeps the doctor away, but nutrition awareness and mouthguard use keep the sports dentists at bay. Athletes are at an increased risk for poor oral health due to the high levels of sugars and carbohydrates within sports products as well as the increased incidence of oral trauma during their sport. It is the responsibility of sports dentists to maintain the oral health of athletes, most importantly by educating the involved personnel about the risks of poor nutrition as well as the availability and refusal to use protective gear.

RESEARCH SHOWS THAT there are many aspects of sports that affect oral health, including the nutrients consumed, the lack of education about the risk factors specifically for athletes, and the nonuse of mouthguards against trauma. After all, oral health does affect the quality of life of the athletes and that alone is enough cause for concern¹. Many scholars within this discourse community know that the use of mouthguards and other protective wear is beneficial for the oral health of the athletes, but many do not agree on which steps ought to be taken in order to have them be more commonly utilized. Some discussion leads more towards having mouthguards be legally required for athletes, while others say the approach needs to be more social in order to make them a norm. The other aspect of nutrition is also discussed as the scholars agree that there is a higher risk of poor oral health rooted in an athlete's diet due to the amount of sugar consumed. I argue that the answer to both of these issues is the practice of education. The education of all personnel involved in the sports, such as athletes, coaches, team dentists, etc., will allow for a greater understanding of the risks and options available to avoid issues while also encouraging the athletes to make educated decisions in regard to their oral health. In this manner, the importance of preventative gear and nutritional or habitual changes can be conveyed to decrease the occurrence of sport-related oral health issues. For this reason, oral health professionals within sports dentistry need to educate athletes about strategies to prevent poor dental health about the use of preventative gear.

NUTRITION

Literature Review

It is evident through multiple studies within the sports dentistry discourse community that the occurrence of poor oral health, such as dental caries and erosion, is at a high prevalence within athletes. In a research study conducted by Needleman et al, they found that “dental caries, dental erosion, periodontal disease and pericoronitis (infection around impacted teeth) are the principal oral health conditions affecting athletes.”¹ This conclusion was supported by another study, conducted by Gallagher et al, where 352 athletes in the UK that participated in one of eleven sports were given a dental exam. Gallagher explains, “We found caries... in 49.1% of athletes,... gingival bleeding on probing/presence of calculus... in 77.0% and pocket probing depths of at least 4 mm... in a further 21.6%. One in five athletes reported previous wisdom teeth problems.”² The occurrence of poor oral health is evidently high, but the question remains if this prevalence is higher than that of non-athletes. Gallagher et al compared the incidence of poor oral health in athletes with that of the “most recent national oral health survey in England and Wales” via the Adult Dental Health Survey, and explains:

We reported established caries in 49% of athletes compared to 36% of adults aged 25-34 from the ADHS 2009; 15% of athletes had 3 or more teeth affected compared to 10% of a comparable group from the ADHS 2009. We found that 22% of athletes had pocket probing depths of ≥ 4 mm compared to 19% of adults aged 16-24 from the ADHS 2009. We reported ETW in 42% of athletes with a BEWE score 9 or more in 12%; the ADHS 2009 reported toothwear in 52% of adults aged 16-24 with moderate wear in 4%; the prevalence of ETW was greater in men than women in both groups.²

It is evident that poor oral health is not only high in athletes but, comparatively, is consistently higher than the overall population as seen in the population of England and Wales. This conclusion can be assumed to be similar to the population of the United States, as the culture of sports, nutrition, and dental care norms are very similar between the three countries. (However, Gallagher's study did not have a proper control group, so these inferences have to be viewed with caution.) For this reason, a comparative study should be conducted in order to make more scientifically sound and supported conclusions between the oral health of athletes and nonathletes.

Moreover, sports dentists need to address the issue of poor dental health within the realm of nutrition, as many dental caries and oral health-related issues stem from the promoted sports products such as energy bars and sports drinks. Needleman et al explain, "Nutritional intake, including usual diet, sports drinks and supplements is a major determinant of oral health, including dental caries, periodontal disease and dental erosion."¹ It is important to recognize that an athlete's eating regimen is a risk factor for poor oral health. Consumption during training sessions consists of foods and drinks with high carbohydrate and sugar composition, each of which is a leading factor in periodontal disease, dental caries, and erosion.^{1,2,3} Touger et al explain the relationship between sugar consumption and dental caries as a "dynamic relation" where the dental "quantity, pH, and composition of the saliva" are affected as sugars "provide substrate for the actions of oral bacteria, which in turn lower plaque and salivary pH. The resultant action is the beginning of tooth demineralization."⁴ In an exploratory study conducted in New Zealand by Bryant et al, 83.9. % of triathletes were found to consume sports drinks while training and 93.5% reported consuming food during sessions.³ Because each of these products has a quite high quantity of sugars and carbohydrates, the bacteria feed on these molecules and produce an acid that causes tooth decay.⁵ Consuming these sports products during training means that that acid is allowed an extended amount of time to damage the tooth enamel since the athletes are not able to brush their teeth until their training is complete.

Furthermore, this issue of poor oral health is significant for athletes as it not only is problematic for future dental longevity and vitality but it also negatively affects the performance of the athletes.^{1,2} Needleman et al explains in the research study, "Oral health is one of the determinants of life quality. There is a wealth of literature demonstrating impacts of oral diseases on the quality of life including caries, periodontal disease and pericoronitis. With clear

psychosocial impacts of oral health, it would be surprising if training and performance were not affected in those athletes with poor oral health."¹ This speculation of Needleman et al is supported by the study of elite UK athletes, within which Gallagher et al found that: "Overall, 32.0% athletes reported an oral health-related impact on sport performance: oral pain (29.9%), difficulty participating in normal training and competition (9.0%), performance affected (5.8%) and reduction in training volume (3.8%). Other impacts were difficulty eating (34.6%), relaxing (15.1%) and smiling (17.2%)."² Within this study, Gallagher et al found that dental trauma such as "acute dental or orofacial infections"² negatively affects performance as the occurrence causes a loss of time to train and compete. On a more chronic level, pain and agitation derived from oral health issues lead to "a reduction in quality of training, are commonly reported, and at elite level may have important consequences."² Needleman et al echoes this conclusion, summarizing their systematic review saying that "poor oral health could affect performance directly through pain arising from disease conditions but also more subtly from effects such as increased systemic inflammation and psychosocial impacts that may be less evident to athletes themselves."¹

On the other end of the spectrum, nutrition also is a factor when an insufficient amount is consumed. Athletes participating in sports in which body weight is regulated or body aesthetics are important are at an increased risk of eating disorders, which also play a role in poor oral health.¹ Within the article, Needleman et al explain this occurrence:

In several sports body weight, composition and aesthetics are crucial factors to the athlete, increasing the risk of eating disorders...It has been shown that the elite athlete is more susceptible to eating disorders than the average member of society...There is a role for the general dental practitioner and the sports dentist in particular to detect signs and symptoms of tooth erosion as a result of eating disorders. It is therefore critical that elite athletes are screened for not only dental disease but what can be the first/earliest signs of eating disorders that manifest themselves in the oral cavity.¹

There are various types of eating disorders that can lead to dental issues. Bulimia Nervosa, for example, is an eating disorder in which one has "recurrent inappropriate compensatory behavior to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, enemas or other medications, fasting, or excessive exercise."⁵ The vomiting from this disorder is what causes dental issues, as "gastrointestinal complications can occur at any part of the gastrointestinal tract from the mouth to the colon.

Dental erosion from gastric acid may occur and may be irreversible.”⁵ Evidently, it is imperative for sports dentists to consider both sides of the spectrum when aiding in the oral health of athletes in terms of nutritional intake and its effects on the oral cavity.

Education

Sports dentists need to address the issue of poor dental health within the realm of educating the players about its importance; how to maintain it, improve it, and about the risk factors of being an athlete so that they can take measures to improve their oral health. Saini echoes this notion, stating that “education of all those involved is the key. Team physicians, dentists, athletic trainers, and coaches must take into consideration both the athlete’s previous medical history and the sport.”⁶ Many of the oral health issues are not unavoidable, and therefore can be combated. It is clear through Bryant’s questionnaire of elite triathletes in New Zealand, as the experimenters found that “only 3.2% perceived training as high risk to oral health.”³ This low of a statistic demonstrates a lack of education that can easily lead to poor decision-making over the years that cause dental caries in the athletes. The education of these athletes on nutrition and prevention aspects can be an effective first step in having the athletes, themselves, take measures against the risk factors they face in their sports. Needleman et al supports this notion as he supplies that:

oral diseases are preventable with well-characterised interventions at low cost. Some interventions are more dependent on behavioral change and adherence to care than others. To achieve a sustained effect, oral health should be embedded within other aspects of health promotion taking into account the structural issues and inter-relationship of athletes within their sport and peer networks.¹

In this way, the role of education should be incorporated in the sports dentist-athlete relationship dynamic. Sports dentist should not merely fix issues once they arise, but instead they should take measures to promote prevention. This could be seen through explanation of the effects of nutrition on oral health, as well as the benefits of preventative gear, such as mouthguards.

Educating the athletes about the effects of nutrition is an important aspect, as there are many options that athletes can consider in order to increase their oral health. Needleman et al offers a few options, saying, “Simple interventions may have a dramatic impact on oral health including use of high strength fluoride toothpastes, other topical fluoride preparations, behavioural change related to diet and oral hygiene (effective dental plaque removal) and

pattern of use of acidic drinks, for example, sports drinks.”¹ In this way, athletes will gain an understanding of how what they consume affects them and can take measures to combat those risk factors, such as not consuming as many, brushing their teeth more regularly, and getting teeth cleanings more often.

PREVENTION

Literature Review

Many dentists promote preventative measures, such as mouthguards, so that athletes will be equipped with the technology that can aid in the prevention of oral health-related injuries. Sports dentists are tasked with the job of attending to the oral health of athletes, including the treatment of orofacial injury as well as promoting the use of preventative measures such as mouthguards.⁶ Saini explains this claim, saying:

Mouth protection for athletes is one of dentistry’s contributions to sports medicine. It is the responsibility of the dental profession, therefore, to become more active in sports injury prevention programs. Mouthguards provide protection against injuries to the orofacial area, including the teeth, lips, cheeks and tongue, thereby reducing the incidence and severity of injuries that occur during athletic practice and competition. They also have been shown to prevent head and neck injuries, concussions and jaw fractures.⁶

It is evident that the use of mouthguards is scientifically proven to benefit the athlete and aid in the prevention of oral trauma. In his systematic review Knapik states that “risk ratios ranged from 1.6 to 1.9 for the different groups of studies examined” when assessing studies in which athletes that use mouthguards are compared to those that do not.⁷ Roettger supports this claim as he utilizes the principles of Occam’s Razor, which states “the simplest solution to complex problems is the best and that if a cause is both true and sufficient to explain a phenomenon, there is no need to look further than addressing that single cause.”⁸ When applied to sports dentistry, this principle concludes that “...since the automatic protection of the teeth and mouth provided by mouthguards and face masks is proven effective in the most high-risk sports, some variation of one or both should be written into the rulebooks of other less risky activities.”⁸

Despite the scientific support, the importance and use of mouthguards is still widely disregarded and rarely utilized when not required. Thierer states that “there is significant evidence which supports the use of mouthguards for many sports, yet in both requirements and practice, this protective equipment is not being used to the extent that the scientific community recommends.”⁹ Sepe et al

conducted a study in which 359 participants who were involved in one of twelve different sports were given a questionnaire in order to evaluate their understanding of the role and benefits of mouthguards. The results concluded that 10.9% had experienced dental trauma and only 11.2% of those participants used them. The reported answer to why the other 44.2% of the participants who knew about mouthguards was due to a lack of aesthetic.¹⁰ If more than merely 11.2% of the athletes had worn a mouthguard, it is reasonable to assume that the 10.9% that experienced dental trauma could have prevented or decreased the sport related damage.⁹ In fact, Roettger explains that “the data and studies on the use of athletic mouthguards to diminish or prevent dental injuries are voluminous and should be a vital consideration for anyone who is active in a sport which might lend itself to physical contact or an accidental blow to the orofacial region.”⁸

Not only are mouthguards proven to prevent or lessen orofacial injury, but they are also an easy, undisturbing, and effective way to prevent many dental injuries while not having it affect athletic performance. Roettger supports this claim within *Modern Sports Dentistry*:

The ideal piece of protective sports gear should be characterized by several features. First and foremost to the athlete, the device should not interfere with the player’s ability to perform his or her activity to the optimum of their capability. It should not be a distraction and it should be comfortable. It cannot interfere with the athlete’s ability to communicate with teammates and should not interfere with his or her perception of their ability to breathe. It should not impact the game in any way such as the potential for a football helmet to be used as a striking device in American-style football. It should be able to show conclusively that it is effective. And finally, it should not interfere with the player’s enjoyment of the sport or his or her participation in it. The properly designed, fabricated, and fitted mouthguard has the ability to achieve all of these goals.⁸

It is now evident that mouthguards are scientifically proven to decrease the frequency and severity of oral trauma while not inhibiting athletic performance. For this reason, the use of mouthguards is an effective and non-inhibiting preventative measure that should be promoted by sports dentists.

Education

Education within the realm of prevention devices is another way in which sport dentists can equip athletes to avoid oral trauma. In this way, Saini explains that “many athletes are not aware of the health implications of a traumatic injury to the mouth or of the potential for incurring

severe head and orofacial injuries while playing. The dentist can play an imperative task in informing athletes, coaches and patients about the magnitude of dental sciences in preventing orofacial injuries in sports.”⁶ Increasing an athlete’s knowledge of the severity of oral trauma can increase the chance of taking steps to prevent such incidents, however many athletes are not even aware of the existence of protective devices. In fact, Sepet’s study showed that 55.4% knew about mouthguards, leaving 44.6% unaware of their availability as a preventative measure.¹⁰ It is reasonable to infer that if more athletes were educated about their existence, a higher percentage would consider using them.

Some sports dentist believe that mouthguards should be made mandatory, however this process is long, and I argue that creating a law to support the cause is not the only way, nor the most effective. After all, Sepet’s study that says from the 41% of athletes who knew about the existence of mouthguards chose not to wear it due to a lack of aesthetics.¹⁰ It is reasonable to conclude that if athletes are against the appearance of mouthguards, and have been proven to justify this reasoning as enough to forgo their use, implementing a law to mandate them would not keep them from finding a way around it. In fact, the law would have to apply to all athletes of that sport or else players may be convinced to go places without the policy. For this reason, athlete buy-in may prove to be the successful route of creating a foundation for their implementation. Education and promotion are two influential aspects that sports dentists can use in order to convince athletes while policies are being debated. Furthermore, for some athletes, the knowledge of the severity may not be enough to convince them to utilize mouthguard, however there are other ways in which the athletes can be reached. For example, if athletes know that the state of their oral health is a factor in athletic performance, they are more likely going to prioritize it more than they currently do. The study by Needleman et al showed that “the proportion of athletes reporting a negative impact of their oral health included 33–66% following trauma, 28–40% being bothered by their oral health or with an impact on their quality of life and 5–18% with an effect on performance.”¹¹ It is common knowledge that athletes care deeply about their performance, and using this fact in order to promote preventional gear could be proven to be very effective.

Finally, for both nutritional and preventive aspects of oral health, a part of educating athletes of the importance of oral health is to come alongside the athlete in order to aid them in the process of prevention. Needleman provides the statement that “regular assessments of oral health by

a dental professional, especially pre-season, will allow for personalisation of prevention plans and early treatment of any disease.²¹ In this way, the sports dentist can fabricate a relationship with the athletes and both inform them of the risks and consequences, while offering their aid in the athletes' path to an improved overall oral health. After all, it is the decisions of the athlete, personally, that will determine the state of their oral health; sports dentist can only supply them with the information and tools to succeed in improving their oral health.

CONCLUSION

In conclusion, oral health professionals within sports dentistry are responsible for addressing the issue of poor dental health within the realm of nutrition and use of preventative gear through the policy of education. First, within nutrition there are multiple studies that provide evidence that the occurrence of poor oral health, such as dental caries and erosion, is at a high prevalence within athletes. Factors that attribute to this prevalence include sports products such as energy bars and sports drinks, as well as a lack of nutrition and effects of eating disorders. Each of these occurrences cause issues of dental longevity and vitality, as well as negative effects on athletic performance. Second, within prevention, sports dentists are responsible for the promotion of protective measures, such as the use of mouthguards. The use of mouthguards is not only scientifically proven to decrease the incidence and severity of dental trauma, but are an effective and undisturbing method to do so. Third, the policy of education should be promoted by sports dentist in the future in order to inform athletes of these risk factors of being an athlete, while providing guidance and instruction on how to attain and maintain an improved oral health. This education should include that of the effects of nutrition and how to attain improved habits as well imparting the importance of preventive gear use. It remains unknown whether or not making mandatory the use of mouthguards and nutritional regimens would eradicate the incidence of dental trauma and poor oral health in athletes. However, it seems evident that sports dentists should impress upon the athletes the severity of poor nutritional habits and the importance of protective gear. Perhaps sports dentist should begin conducting regular dental examinations and screenings, meeting each athlete in their current situation in order to educate them on the

risks and consequences of poor oral health and offering them solutions.

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