



The Importance of Oral Health in High Performance Athletes: A Brief Review

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Abstract

The purpose of this review is to present the reality of oral health among high performance athletes. All data collected and pertinent information to construct this review was retrieved from the indexed scientific literature. The results observed enhanced that the oral health among high elite athletes has been neglected. There is a necessity to apply the previous knowledge about preventive oral medicine and its benefits to improve the performance of this population in prospective studies with long term follow-up.

Keywords: Oral health; Periodontal disease; Elite athletes; Olympic games

Introduction

Some studies [1-3] have consistently reported poor oral health in elite athletes since the first report from Berlin Olympic Games in 1936. The findings is consistent both across selected samples attending dental clinics at major competitions and more representative sampling of teams and has led to calls from the International Olympic Committee for more accurate data on oral health. Poor oral health is an important issue directly as it can cause pain, negative effects on appearance and strong effects on confidence and quality of life and may have long-term consequences for treatment burden. Self-reported evidence also suggests an impact on training and performance of athletes [2,4]. There are many potential challenges to the oral health of athletes including nutritional, oral dehydration, exercise-induced immune suppression, lack of awareness, negative health behaviors and lack of prioritization [2]. The aim of this review is to show what has been happening in high performance athletes' oral health. All data collected and pertinent information was retrieved from the scientific papers in relevant indexed journals.

What have we already known about the Interaction between Systemic Disease and Oral Health?

The 8th World Congress on Preventive Dentistry emphasized that oral health is an integral part of general health and wellbeing and a basic human right. The participants and Associations support the efforts of the World Health Organization (WHO) Oral Health Programme which aims at coordinating and supporting inter-country sharing of experiences in health promotion and oral disease prevention. The good news is that oral diseases are preventable, easy to treat at the beginning and considerable improvements can be made if appropriate public health programs are established [5]. Periodontitis or periodontal disease (PD) is characterized by alveolar bone and clinical attachment loss, gingival inflammation and increased tooth mobility. Most forms of PDs are chronic inflammation however, there are acute forms and both of them are related with specific bacterial infection accumulated around teeth [6]. Approximately 90% of the world's population experiences mild to advanced PD and increased inflammatory markers had been found among patients. Activation of systemic inflammatory processes can be linked to increase the risk of cardiovascular disease, diabetes mellitus, pulmonary disease, rheumatoid arthritis, cerebral vascular disease, adverse pregnancy outcomes and cancer [7,8]. It has been suggested that active PD can disseminate bacterial species via bloodstream and, in this way, impact on systemic health influencing the host response factors [7,9]. The treatment of PD should be simple and cheap as cleaning the teeth above and below the gingival line, termed "scaling and root planning", which is sometimes, can be improved by use of mouth rinse, patient education, training in oral hygiene, and counseling on control of risk factors. In more advanced cases, periodontal surgery may also be required. Such procedures aim to reduce gingival inflammation, thereby reducing bacterial bio

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Received Date: 09 Jan 2017

Accepted Date: 06 Feb 2017

Published Date: 09 Feb 2017

Citation:

Henriques PSG, Sukekava F. The Importance of Oral Health in High Performance Athletes: A Brief Review. *J Dent Oral Biol.* 2017; 2(4): 1037.

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films on the tooth and root surface, ultimately leading to a reduction of both bacterial populations and transmission of bacteria and toxins through the gingival tissue [7,10]. Tooth decay/dental caries is a tooth disease exhibiting clinical features like cavities and darkened teeth. The active lesion is initiated by bacterial plaque accumulation around teeth, as the same way PD. So, both diseases are, essentially, caused by a lack of oral hygiene. *Streptococcus mutans*, a major pathogen of dental caries, is also considered to be one of the causative agents of infective endocarditis (IE), which is an infection of either the heart's inner lining (endocardium) or the heart valves can be serious or even sometimes fatal illness [10,11]. The treatment of tooth decay can be simple and cheap as treatment to PD, including patient education, training in oral hygiene, counseling on control of risk factors and filling and more advanced cases, endodontic treatment or even tooth loss.

What are the Real Benefits from Oral Care to the High Performance Athletes?

The mechanisms behind negatively affects from oral diseases over the training and performance of elite athletes might include distress, pain, reduced well-being and quality of life and increased systemic inflammation [1-3] published a systematic review about the epidemiology of oral disease and trauma in the high performance athlete's population and the impact of their oral health on sporting results. The data depicted that: i) despite the excellent systemic health, the oral health is poor among various sports; ii) dental caries, erosion and PD are the most frequent oral disease and finally; iii) poor oral health can impact directly on the elite athlete's performance. The search strategy found data since 1950 and showed the negligence around oral health. Even though the most part of athletes in included papers were from developed countries with a well-organized oral health system. The British Cycling Federation (BCF) has established a preventive medical program screening for its athletes during the "off season" period to avoid physical injuries and decreasing performance during the competitive months since 1990. In 1996 they published the results and it was demonstrated again, among high performance athletes the oral health is neglected: 21% of all cyclists examined needed some sort of dental treatment [12]. Poor oral health can cause pain and distress episodes, aesthetical negative aspects, psychological effects, and difficulties in eating and sleeping and muscles/tendons reinjures. All these situations can present short-term consequences, for example decreasing the athletes' performance in the day of the final competition, as well as long-term effects [1-3,12-14].

Eating Habits and Oral Disease

Unhealthy eating habits, which can induce overweight, may be involved in the development of this PD in young people [15] conducted a cross-sectional study of 801 university students that aims to examine the relationships among overweight, eating habits, and the periodontal condition in university students. Patients were classified as underweight, normal weight, and overweight. Students completed a questionnaire including items related to eating habits and underwent oral health examinations. Patients with a community periodontal index (CPI) of 0 to 2 were considered no-disease and patients with a CPI >2 were considered to have PD. The prevalence of underweight, normal weight, and overweight patients was 21%, 62%, and 17%, respectively. In overweight patients, the PD risk was increased by the frequent consumption of fatty and reduced by the frequent consumption of vegetables. In underweight and normal-weight groups, eating habits did not differ significantly

according to the presence of PD. In overweight students, the frequent consumption of fatty foods and infrequent consumption of vegetables were associated with an increased risk of PD. Obesity and exercise are important elements associated with lifestyle-related diseases, and studies suggested that these factors may also be related to PD. A study investigates the relationship between obesity and physical fitness and PD in 1160 Japanese subjects. Periodontal conditions were evaluated using the CPI and subjects with > or =3 sextants of CPI code 3 or 4 were defined as having severe PD. The authors used the body mass index (BMI) and percentage of body fat as indicators of obesity and estimated the maximal oxygen consumption during exercise as an indicator of physical fitness. The examination evaluated the single effect and interactions of the obesity index and maximal oxygen consumption on severe PD. The lowest quintile in BMI and the highest quintile in maximal oxygen consumption were inversely associated with severe PD. Subjects with the combined lowest quintile in BMI and the highest quintile in maximal oxygen consumption had a significantly lower risk of severe PD compared to subjects with other combined quintiles in BMI and in maximal oxygen consumption. These results suggest that obesity and physical fitness may have some interactive effect on periodontal health status [16]. Rich diets in vegetables and vitamin C also appear to associate positively with better periodontal health and negatively with PD progressing more rapidly in undernourished populations [17]. In recent years, strong evidence has emerged that diets rich in refined carbohydrates and saturated fats are pro-inflammatory, whereas those rich in polyunsaturated fats (fish oils), antioxidant micronutrients (fruits, berries and vegetables) and certain nuts (cashews) are anti-inflammatory, like a "stone-age" diet [18,19].

What Are the Complications from Elite Athlete's Preparation on Oral Health?

Elite athletes follow demanding training regimes to achieve optimal performance in taking dietary supplementation, sports drinks, multivitamin and mineral preparations, carbohydrate sports bars, protein powder, and meal-replacement. The important role of a disease-free oral cavity for peak performance is often overlooked and oral health may be compromised [12,13,20] tried to answer which are the risk factors for tooth decay/erosion among elite triathletes, using questionnaires regarding training, diet and oral health, and clinical examination performed in 10 athletes randomly selected. Sports drinks were consumed by 83.9% of the triathletes while training; for 48.4% consumption of both sports drinks and water. Eating during training sessions was reported by 93.5% of participants; of those 62.1% ate only during cycling training. Only 3.2% perceived training as high risk to oral health. All clinical examination cases were assessed as high risk for developing caries. The elite triathletes' diet is consistent with a high risk profile for tooth decay and erosion as well observed [20]. Piccininni & Fasel observed that sports beverages can be harmful for athletes' dentition causing tooth erosion/dental caries and this event can be preventable if the athletes and their staff were properly educated to change habits and minimize the effects. There are some evidences that elite athlete is more susceptible to eating disorders than the average member of society. The need to particularly reduce weight in some specific sports can lead to eating disorders being prevalent [21]. Nutrients, such as vitamin E, vitamin C, carotenoids, polyphenols, glutathione and trace elements, can contribute directly and indirectly to the robustness of antioxidant defenses of the host. Oxidative stress is involved in the pathogenesis of a number of diseases, including PD. An adequate intake of antioxidants may be important for preventing

oxidative stress syndrome [22]. Protection of the athletes' health is a clearly objective of the International Olympic Committee, during preparation period as well during competitions. Longitudinal surveillance of injuries and illnesses can provide valuable data that may identify high-risk sports and disciplines. During the XXIX Summer and XXI Winter Games, comprehensive injury and illness recording through the medical staff of the participating National Olympic Committees and the sports medicine clinics revealed that between 7% and 11% of all athletes incurred an injury or suffered from at least one occurrence of illness during the Games. The incidence of injuries and illnesses varied substantially between sports [23]. Callaghan MJ had an important example of preventive action. They followed-up for 6 years the bikers from BCF and observed that more than 20% needed dental care and neglected the most basic treatment. So, the BCF provided all the treatment necessary previous the competitive season and consequently to obtain the better results from these athletes. The London 2012 Summer Olympic Games involved 10568 elite athletes from 204 different countries. To manage and control the varied healthcare needs of this diverse population, a huge Polyclinic was constructed in the athletes' village and all treatments were entered into a database to cover the first to last full day of competition. There were a total of 3220 encounters, and 2105 medical consultations; musculoskeletal comprised the greatest number (52%), followed by dental (30%) and ophthalmic (9%). Overall, oral health was consistently poor across these studies, especially considering the young age of the participants. Dental caries, periodontal disease, dental erosion and pericoronitis/impacted third molars were widely reported. The range of proportion of athletes affected by these conditions was: dental caries 15–75%, moderate-to-severe PD up to 15%, dental erosion 36–85% and pericoronitis/impacted third molars 5–39%. Dental trauma was reported by 14–57% of athletes in at-risk sports. Africa provided the largest proportion of athletes attending the Polyclinic (44%) and Europe the least (9%). Peak usage of all facilities was seen around days 9 and 10 of competition, reflecting the busiest time of the competition and the largest number of athletes in the village [24]. In the same population, Needleman observed more accurately 55% of calls presented dental caries, 45% dental erosion and PD (gingivitis 76%, periodontitis 15%). Almost half of athletes were concerned with their oral health and his impact on quality of life and on training and performance. The maintenance treatment as examination or hygiene care was performed only nearly half of the participants during the previous year.

What can we do now?

As mentioned [3,13,23,24], using a similar structure of facilities and available expertise from previous Olympic Games, future research of risk factor; injury mechanism; oral health and periodic health evaluations of athletes should be perform and injury-prevention; oral health strategies should be built to optimize health protection.

All studies above could be a reference to the future Olympics and mainly to high performance athletes involved in these competitions and their staff implicated. The Olympic Committee from each country registered for Tokyo 2020 can, at least six month before the next games, to perform in their athlete's complete examination in systemic health interrelationships, the necessity to produce a custom made mouth guard, intraoral examination to detect tooth decay, periodontal diseases, endodontic lesions, and pericoronitis and to manage specific treatment needs, when appropriate. In this way, control of risk factors, patient education in health promotion and

training in oral hygiene under supervision can reverberate in athletes' best performance.

Conclusion

Oral health is an integral part of general health. Self-reported evidence suggests that poor oral health have an impact on training and performance of athletes. The important role of a disease-free oral cavity for peak performance is often overlooked and oral health may be compromised. The protection of the athletes' health is a clearly articulated objective of the International Olympic Committee and consensus statement aims to raise awareness of the issues of oral health in elite sport and recommends strategies for prevention and health promotion in addition to future research strategies that can reverberate in athletes' best performance. There is a lack of information from prospective studies about the benefits of preventive and also outpatient oral health care on elite athlete's performance.

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