DOI: 10.18311/ijsdps.1.1.2026.1-6 Vol 1(1), 2026 | pp. 1-6

The International Journal of Sports Dentistry and Performance Science

NARRATIVE ARTICLE

Beyond the Playing Years: Oral Health Challenges in Ageing and Retired Athletes

Deepanker Udupi Dinesh[1]* and Vinaya Kundapur[2]

[1]Department of Prosthodontics, Dayananda Sagar College of Dental Sciences, Bengaluru - 560111, Karnataka, India
Email: drdeepankerud97@gmail.com

[2]Geriatric Dental Clinic, UT Health San Antonio School of Dentistry, University of Texas Health Science Centre, San Antonio, Texas - 78229, United States

Keywords: Ageing Athletes, Geriatric Dentistry, Interdisciplinary Care, Oral Physiology, Quality of Life, Restorative Fatigue, Sports-Related Dental Trauma (SDT), Traumatic Dental Injuries (TDIs)

Article Received: 01-04-2026
Article Revised: 15-04-2026
Article Accepted: 30-04-2026

Abstract

Introduction: SAdvances in sports medicine have significantly extended the athletic lifespan, yet the long-term cumulative impact of sports participation on oral health remains underappreciated. Ageing and retired athletes present a unique clinical profile where historical Sports-related Dental Trauma (SDT) intersects with age-associated physiological decline. **Objectives:** This narrative review evaluates the lifelong oral health challenges faced by ageing athletes, focusing on the sequelae of Traumatic Dental Injuries (TDIs), restorative fatigue, and the physiological changes of the ageing dentition. **Methods:** A review of current epidemiological data and clinical literature was conducted to analyse the prevalence of dental trauma in contact versus non-contact sports and its delayed biological consequences, including pulp canal obliteration and inflammatory root resorption. **Results:** Athletes in contact sports (e.g., football, rugby, martial arts) exhibit a significantly higher incidence of TDIs compared to non-contact athletes. However, even non-contact athletes face risks from repetitive microtrauma and parafunctional habits like clenching. As athletes age, diminished salivary flow, increased brittleness of ageing dentin, and mechanical fatigue of existing restorations (crowns, veneers) complicate oral function. Furthermore, cumulative tooth loss in this population is linked to broader geriatric concerns, including nutritional deficiencies and an increased risk of physical and mental disability. **Conclusion:** Sports-related dental trauma is a lifelong condition requiring a lifespan-oriented, interdisciplinary model of care. Integrating oral health maintenance into geriatric and athletic training frameworks is essential for preserving quality of life and functional performance in physically active seniors.

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1. INTRODUCTION

Advances in sports medicine and training have revolutionised the athletic lifespan, allowing athletes to compete, train, and stay physically active well beyond what was once considered retirement age. While the rewards of this extended activity, stronger hearts, sharper minds, and resilient musculoskeletal systems, are widely celebrated, a hidden consequence often goes unnoticed: the long-term impact of sports participation on oral health. Years of high-impact collisions, repetitive stress, and dental trauma can leave a lasting imprint on the dentition, only becoming apparent decades later as athletes age. The pursuit of sports and physical activity confers broad health benefits across the lifespan, including lower risks of metabolic, cardiovascular, and neurocognitive decline. Regular exercise is safe and beneficial for both healthy and frail older adults, reducing the risk of disability, fall incidence, and chronic disease progression. Physical activity can attenuate sarcopenia and improve neuromuscular function, balance, and postural control in older individuals[1-3].

This narrative review shines a spotlight on the often-overlooked oral health challenges faced by ageing and retired athletes. This review aims to equip clinicians with the tools to preserve oral function, comfort, and quality of life in this unique and growing population with a focus on strategies for prevention, monitoring, and interdisciplinary care.

2. SPORTS-RELATED DENTAL TRAUMA: PREVALENCE AND LONG-TERM SEQUELAE

Despite increasing recognition of the general health benefits of lifelong sports participation, the oral health risks associated with sustained involvement in sports, particularly contact and high-impact disciplines, remain underappreciated and insufficiently addressed. While acute dental injuries agonised during athletic participation are often managed promptly, growing evidence suggests that the long-term consequences of sports-related dental trauma frequently emerge years or decades later, complicating oral function and treatment needs in older age[4,5].

Sports-related dental trauma commonly includes enamel–dentin fractures, complicated crown and root fractures, pulp injuries, luxation injuries, and tooth avulsions[4]. Systematic reviews and epidemiological studies of elite and amateur athletes consistently report a high burden of oral disease, including TDIs, dental caries, erosive tooth wear, and periodontal disease. The reported prevalence of dental trauma among athletes ranges from approximately 14% to 47%, varying by sport type, level of competition, age, and protective equipment use[6,7]. A recent literature evidence comparing dental trauma in contact versus non-contact sports highlights substantial differences in both the prevalence and severity of TDIs across sporting disciplines. The review demonstrates that athletes participating in contact sports, including football, rugby, hockey, boxing, and martial arts, consistently exhibit a higher incidence of dental trauma, particularly crown fractures, luxation injuries, and tooth avulsions. These injuries are primarily attributed to direct physical contact, collisions, and impact forces inherent to these sports. In contrast, non-contact sports, such as athletics, cycling, gymnastics, and swimming, show a lower overall prevalence of dental trauma; however, injuries still occur, often resulting from falls, accidental collisions, or repetitive functional loading. Notably, the review emphasises that repetitive microtrauma and parafunctional habits, such as clenching during training, may contribute to enamel fractures, tooth wear, and Temporomandibular Joint (TMJ) symptoms even in non-contact athletes[8,9].

Importantly, the biological sequelae of TDIs are often delayed and progressive. Teeth affected by prior trauma are at increased risk for pulp canal obliteration, pulp necrosis, external and internal inflammatory root resorption, replacement resorption (ankylosis), and premature tooth loss[10]. These pathological processes may remain asymptomatic for prolonged periods and are frequently detected only during routine radiographic surveillance. As athletes age, the interaction between prior trauma, restorative fatigue, age-related reductions in reparative capacity, and systemic health changes further magnifies the complexity of care. Consequently, sports-related dental trauma should be regarded as a lifelong condition rather than an isolated event, underscoring the need for long-term monitoring, preventive strategies, and anticipatory treatment planning extending well beyond the playing years[11].

3. AGE-RELATED ORAL PHYSIOLOGICAL CHANGES

Ageing is associated with diminished salivary flow and altered saliva composition, reduced reparative capacity of oral tissues, and increased prevalence of caries and periodontal disease. Root caries incidence increases with gingival recession and medication-induced xerostomia. Periodontitis, a chronic inflammatory condition affecting supporting tooth structures, increases in prevalence and severity with age, contributing to tooth loss and prosthetic challenges. Older adults also experience decreased neuromuscular coordination and bone density, affecting mastication, prosthesis stability, and temporomandibular function, factors that can be exacerbated when compounded by prior traumatic injuries[12-14].

4. THE DUAL ROLE OF PHYSICAL ACTIVITY IN OLDER ATHLETES

Ongoing physical activity remains a cornerstone of healthy ageing, with strong evidence showing benefits for mobility, balance, muscle strength, and cardiometabolic health across the lifespan, including among individuals with or at risk for sarcopenia. Resistance training and regular physical activity are associated with increased muscle mass, improved functional capacity, and a lower risk of falls and frailty in older adults. Despite these systemic benefits, athletic activity may indirectly challenge oral health. Dehydration and exercise-associated xerostomia, exacerbated by heavy breathing, fluid loss, and polypharmacy in older adults, reduce salivary flow and buffering capacity, increasing susceptibility to dental caries and erosion. Frequent consumption of sports and carbohydrate-rich beverages may further promote acidogenic conditions that accelerate enamel demineralisation. Additionally, repetitive occlusal load among athletes, particularly those with a history of dental trauma or extensive restorations, can predispose them to structural fatigue and cumulative damage over time[15-18].

5. RESTORATIVE FATIGUE AND STRUCTURAL FAILURE

Restorative materials placed to address sports trauma damage, including crowns, veneers, and root-canal-treated teeth, are subject to mechanical fatigue and degradation over decades under functional load. Ageing dentin demonstrates increased brittleness and reduced fracture toughness compared with younger tissue, making older teeth more vulnerable to cracks and restoration failure. Additionally, the oral environment in older adults (with altered salivary composition and decreased remineralising capacity) can promote secondary caries and marginal breakdown, further jeopardising the long-term survival of restorations. This highlights the need for restoration planning that anticipates decades of mechanical and biological challenges rather than focusing solely on immediate repair[18-20].

6. TEMPOROMANDIBULAR DISORDERS AND OROFACIAL PAIN

Parafunctional behaviours, such as clenching and bruxism, are often reported in athletes, particularly those involved in high-impact or contact sports, because of stress, performance focus, or occlusal instability. These behaviours place chronic stress on the TMJ and masticatory musculature, increasing the risk of myofascial pain, disc displacement, and degenerative joint changes over time. Epidemiological studies suggest that ageing itself may accentuate TMJ dysfunction due to cumulative microtrauma, altered neuromuscular coordination, and age-related changes in joint cartilage and ligaments contributing to orofacial pain, reduced jaw function, and poorer quality of life in older athletes[21,22].

7. TOOTH LOSS AND PROSTHETIC CHALLENGES

Cumulative oral disease, sports trauma sequelae, and progressive periodontal breakdown inevitably contribute to tooth loss with advancing age. Tooth loss negatively impacts nutrition, speech, mastication efficiency, and self-esteem, especially in physically active seniors whose functional demands remain high. Prosthetic rehabilitation in this population must address retention under functional load, comfort, and

maintenance, considerations that are critically linked to overall quality of life and participation in social and physical activities. Losing natural teeth in later life has been associated with an increased risk of both physical and mental disability among older adults. Research reported by the American Geriatrics Society highlights that tooth loss can negatively affect nutrition, speech, social interaction, and overall quality of life, which in turn may contribute to functional decline and cognitive impairment[23-25].

Impact of Tooth Loss on Nutrition and Systemic Health

i. Nutritional Deficiencies

- *Dietary Shift*: Tooth loss leads to "dietary circumvention," where individuals avoid fibrous, hard-to-chew foods (raw vegetables, fruits, meats).
- *Micronutrient Depletion*: This results in lower intake of fibre, vitamins (A, C, E), and minerals, often replaced by soft, highly processed carbohydrates and fats[26].

ii. The Frailty-Sarcopenia Axis

- *Physical Decline*: Inadequate protein intake due to masticatory failure accelerates sarcopenia (loss of muscle mass and strength).
- *Systemic Inflammation*: Chronic oral inflammation (periodontitis) releases pro-inflammatory cytokines that exacerbate muscle catabolism, linking oral health directly to physical frailty[27].

iii. Gastrointestinal (GI) Dysfunction

- *Masticatory Failure*: Incomplete chewing increases the mechanical load on the GI tract and reduces the bioavailability of nutrients.
- *Digestive Disorders*: Significant correlation exists between edentulism and upper GI issues, including functional dyspepsia, GERD, and delayed gastric emptying.
- *Gastric Mucosa*: Reduced salivary flow—common in ageing edentulous patients—fails to provide the necessary buffering to protect the stomach lining, increasing the risk of gastritis[28].

8. STRATEGIES FOR CARE AND PREVENTION

- *Lifespan-Oriented Risk Assessment*: Comprehensive dental histories should routinely include detailed documentation of sports participation and prior trauma exposure to identify teeth at elevated risk for late sequelae such as pulp canal obliteration, root resorption, or restoration failure. Early recognition facilitates tailored surveillance and anticipatory planning.
- *Protective Measures*: Custom mouthguards offer effective protection against dental and orofacial injuries across age groups and should be adapted for existing restorations and prosthetic appliances. Despite robust evidence supporting their protective benefits, compliance remains inconsistent, highlighting the need for patient education, comfort-optimised design, and integration into regular preventive care.
- *Multifaceted preventive regimens*, including fluoride applications, salivary flow management, dietary counselling to reduce acidic/sugary exposures, and optimised hygiene strategies, are essential in mitigating the cumulative burden of oral disease.

9. INTERDISCIPLINARY COLLABORATION- FUTURE DIRECTIONS

Oral health maintenance for ageing athletes should be integrated with broader healthcare strategies. Dentists must collaborate with geriatricians, physiotherapists, nutritionists, athletic trainers, and primary care providers to align oral health goals with systemic health, functional performance, and quality-of-life objectives. Physical activity regimens should be balanced with individualised preventive oral care plans to mitigate potential adverse effects. There remains a need for

longitudinal, multidisciplinary research that delineates how sports-related dental trauma interacts with ageing physiology, physical activity patterns, systemic health, and functional outcomes. Studies integrating oral health within broader ageing research frameworks, including sarcopenia, cognitive decline, and frailty, will advance understanding of mechanistic pathways, preventive strategies, and clinical innovations to support lifelong oral health in physically active populations.

10. CONCLUSION

The athletic journey does not conclude at retirement; rather, the oral health of an ageing athlete enters a complex phase where the cumulative effects of Sports-related Dental Trauma (SDT) intersect with the physiological challenges of senescence. This review underscores that tooth loss in the ageing athletic population is not merely a localised dental issue but a significant driver of systemic decline. The resulting masticatory failure initiates a detrimental cascade—from "dietary circumvention" and subsequent nutritional deficiencies to the acceleration of sarcopenia and gastrointestinal dysfunction.

To ensure that the physical gains of a lifetime of athleticism are not undermined by oral frailty, a paradigm shift in clinical management is required. We propose an interdisciplinary "lifespan-oriented" model of care that integrates sports dentistry with geriatric medicine. Future efforts must prioritise the long-term monitoring of restorative fatigue and the prevention of tooth loss to preserve nutritional status and systemic vigour. Ultimately, maintaining oral health is essential to ensuring that retired athletes can enjoy a high quality of life, free from the functional and metabolic burdens of edentulism.

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