

Introduction: functional foods and oral health

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The health of oral tissues and organs are, more or less, inevitably related to the chemical, physical and physiological properties of foods and diets. It is recognized that various dietary components may impair oral health; for example, a high frequency of consumption of fermentable carbohydrates such as sugars and starches are considered a risk factor for dental caries when a frequent intake is associated with low oral hygiene. Food acids (phosphoric and citric acid, to name a few) are risk factors for dental erosion.

Already several decades ago, research aimed to identify the role of non-fermentable bulk sweeteners such as polyols in the prevention of dental caries. The tooth-friendliness of polyols, such as erythritol, isomalt, lactitol, mannitol, sorbitol and xylitol, has meanwhile been well established and has led to sugar-free confectionary and chewing gums in which they replace fermentable ingredients.

More recent interests have been focussed on the active potential of foods and diets on oral health and disease prevention. This has led to the development of foods and beverages with ‘functional ingredients’ that provide added benefit to certain oral health conditions or may help to prevent the development or progression of impaired and disease states.

Both passive and active roles of certain functional ingredients on specific oral health functions have been recognized by the European Food Safety Authority in their

positive assessments on the role of sugar-free chewing gums on plaque acid neutralization, maintenance and reduction in tooth demineralisation and reduction in oral dryness. The EFSA also acknowledged the role of these markers to reduce the risk of tooth decay and dental caries.

The purpose of this review is to provide a more extensive and intensive information on the variety of types of functional foodstuffs and drinks, and dietary supplements with perspective on oral aspects. Their effect on various oral health conditions and diseases are summarized, respectively; their characteristic targets and the practical release methodology are assessed; and the possible functional mechanisms are discussed.

Part 1 focuses on whether the prevention of dental caries could benefit substantially from the regular diets or functional supplements. It encapsulates a variety of foodstuffs and beverages, food constituents and functional supplements, for example, trace elements, fruits, plant extracts, food preservatives, as well as the addition of bio-active peptides and probiotic.

Part 2 deals with periodontal disease. The evidence for the beneficial contribution of the diets to the prevention of periodontal problems seems scant, despite wealthy information indicating the relationship between nutrition deficiency and periodontitis. A quite limited numbers of studies on the ‘topical protective effect’ of antioxidants, tea, polyphenols, probiotics and dairy products on periodontal diseases are included, and obviously more scientific evidence is essential.

Part 3 is about the major mucosal disease, for example, yeast and viral infections, oral lichen planus and aphthous stomatitis, and non-specific symptoms of mouth mucosa, for example, xerostomia, burning syndrome and glossodynia, and halitosis. In theory, all these mucosal diseases and symptoms can be modified by selecting healthy

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nutrients and by avoiding foodstuffs or beverages that irritate mucosal surfaces. Practically, it should be made aware that the individual-dependent risk factors and the unidentified etiology for some mucosal problems make many strategies principle rather than practical.

The last part is about dental erosion, which is highly associated with the consumption of acidic foods and drinks. Through comprehensively analyzing the etiology of erosion, it is manifest that the dietary modification and the supplementation of functional ingredients are practical and promising strategies for preventing erosive tooth wear. A vast literature is introduced to explore the effect of different physical, for example, adhesive abilities and displacement abilities, and chemical properties, for example, pH, buffering capacity and degree of saturation with respect to tooth mineral, on the erosive potential of foods and beverages.

To conclude, this report compiles and highlights the potential of functional food ingredients on oral and dental health for future research and development.

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