Review

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N**utrition and the Prevention of Dental Diseases**

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Abstract

There is a close relationship between nutrition and dental health. A portion of food varieties have protective nature for dental health while the other part is damaging. Beverages are also the important factors that affect the health of the teeth. Main studies have showed that there is strong evidence between sugared beverages and dental caries.

Systemic diseases carry significant risks for, dental health. In different main studies have been showed that tooth eruption were related with systemic diseases, such as endocrine disorders, respiratory infections, pregnancy outcomes, rheumatoid arthritis, organ failures, metabolic disorders, drugs, and inherited and genetic disorders.

It could be concluded that, few intakes like black tea exhibited strong antimicrobial effect against streptococcus mutans and lactobacillus bacteria. Consumption black tea will protect the health of teeth. It is important to remember that person should stay away from carbohydrate foods, which include sugars and high consumption of carbonated soft drinks.

Key words: Nutrition, dental health, beverages, systemic diseases, foods

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Introduction

Oral health is related to diet in many ways, for example, nutritional influences on craniofacial development, oral cancer and oral infectious diseases. Dental diseases impact considerably on self-esteem and quality of life and are expensive to treat. Nutrition affects the teeth during development and malnutrition may exacerbate periodontal and oral infectious diseases. However, the most significant effect of nutrition on teeth is the local action of diet in the mouth on the development of dental caries and enamel erosion. Dental erosion is increasing and is associated with dietary acids, a major source of which is soft drinks. Diet also plays a significant etiological role in dental erosion, the prevalence of which seems to be increasing, and dietary components may contribute to development of enamel defects (e.g. enamel hypoplasia , fluorosis). However, in modern societies, diet and nutrition play a relatively minor role in the aetiology of periodontal disease (gum disease), another cause of tooth loss in adults (1).

The causes of tooth decay are complex and multifactor however, there is no doubt that carbohydrate foods, which include sugars, play a role in the development of tooth decay (dental caries). The frequency of drinking sweetened drinks and eating these foods, as well as other factors such as cleaning teeth and the use of fluorides all play a role in the etiology of dental caries. Diet plays an important role in protecting teeth. Just as we should eat well to maintain a healthy body, we need to eat appropriately to maintain a healthy mouth. Carbohydrate foods, including sugar, need not pose a significant risk to dental health if they are consumed mainly at mealtimes and there is adequate oral hygiene with the use of fluoride. The impact of carbohydrates on dental caries is dependent mainly on the frequency of consumption and not necessarily the amount consumed. Nutritional factors are implicated in

many oral and systemic diseases and conditions, including obesity, hypertension, dyslipidemia, type II diabetes, cardiovascular disease, osteoporosis, tooth decay dental caries and some cancers including oral cancers. Tooth decay is also affected by the type of food consumed, degree of oral hygiene performed, availability of fluoride, salivary function and possibly genetic factors. Prevention programmes to control and eliminate dental decay need to focus on dietary habits as well as on the use of fluorides, good oral hygiene and regular check ups. Dentists can play a critical role in motivating and enabling healthy food choices by taking education from Nutritional experts and courses (2,3). Although permanent teeth eruption is under significant genetic control, various general factors such as gender, socioeconomic status, craniofacial morphology, body composition can influence this process. Most significant disturbance in teeth emergence is caused by systemic diseases and syndromes (4).

Systemic diseases

Most of the diseases reported in literature are associated with tooth eruption. There are different mechanisms for the delay, usually it is associated with retained primary teeth, gingival hyperplasia, fibromatosis or hormonal changes which influences bone resorption rate. Diseases that interfere with tooth eruption are listed in Table 1 (4).

Dental diseases were regarded as an alarm bell for future systemic diseases. Around 60% of worldwide mortality is due to chronic non-communicable diseases (CNCDs) that effect the lifetime of individuals for many years. Examples of systemic CNCDs are cardiovascular diseases, diabetes mellitus, certain cancers, and dementia. However, dental caries, periodontal disease, certain oral cancers, and leukoplakia are examples of dental CNCDs. The associations between dental and systemic CNCDs are beeing studies by various hypotheses (5,6).

Table 1* Systemic diseases associated with impaired dental eruption

Vitamin D-resistant rickets	Renal failure
Endocrine disorders	Exposure to hypobaria
Hypothyroidism (cretinism)	Idiopathic
Hypopituitarism	Radiation damage
Hypoparathyroidism	Celiac disease
Pseudohypoparathyroidism	Anemia
Drugs: phenytoin	Dysosteosclerosis
Long-term chemotherapy	Cerebral palsy
Ichthyosis	HIV infection
Oral clefts	Heavy metal intoxication

* From the study of Almonaitiene R, Balciuniene I and Tutkuviene (4)

In different main studies have been showed that tooth eraption were related with systemic diseases, such as endocrine disorders, respiratory infections, pregnancy outcomes, rheumatoid arthritis, organ failures, metabolic disorders, drugs, and inherited and genetic disorders. Various methods have been suggested for treating eruption disorders in these conditions. Elimination of obstacles to eruption eg, cysts, soft tissue overgrowths, exposure of affected teeth with and without orthodontic traction, autotransplantation, and control of the systemic disease (7-10).

Maintenance of good oral health should be given priority. People should be educated on the importance of good oral health and the risks associated with poor oral health. Dentists and medical practitioners should work together to provide comprehensive healthcare, thereby reducing the morbidity and mortality associated with periodontal infections (11).

The Type of Food and Dental Caries

Figure 1 shows the dental caries process. Foods and beverages are two main factors cause dental caries. They are kept for long periods in the mouth or on the teeth, or are consumed with high frequency within a time period, are more likely to cause dental caries than foods that are eliminated quickly from the mouth. The dietary components that

contribute most to the caries process are fermentable carbohydrates. These need to be retained in the mouth long enough to be metabolized by oral bacteria (principally Streptococcus mutans, but others can be involved) to produce acid. The acid attacks the tooth enamel and gradually dissolves it (demineralisation). This demineralization process is offset by the repair process known as demineralization. The balance between remineralisation and demineralisation determines whether caries occurs. Fermentable carbohydrates (those that promote acid production) like starchy, sticky, or sugary foods should not be eaten alone, but combined with protein (e.g., dairy foods) that can buffer acids. For example: cheese and crackers; milk and banana; yogurt and berries; apples and cheese; cookies/crackers and skim milk. Sweets and desserts should be eaten as part of a meal, instead of by themselves. Increased salivary flow during meals helps wash away food and bacteria that sit on the teeth and gum tissues (12, 13).

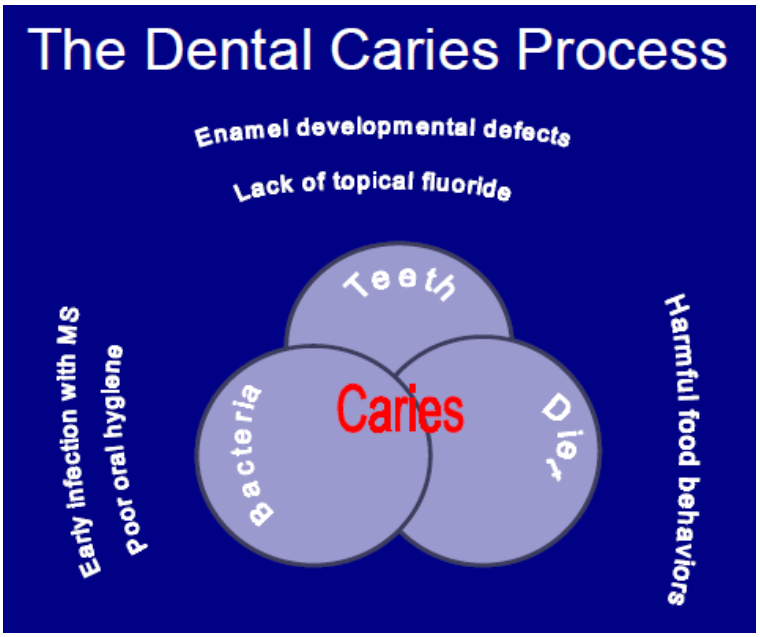

Figure 1. The process of dental caries adepted from (http://www .nal.usda. gov/ wicworks / Topics/oralhealth.pdf)

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Three factors must come together for cavity formation in a tooth: 1) dietary carbohydrate/sugar, 2) dental plaque bacteria, and 3) caries-susceptible teeth. Dental caries are considered a bacterial infectious disease because of the indispensability of cariogenic bacteria that ferment carbohydrates/sugars to organic acids. This behavior was shown in Figure 2.

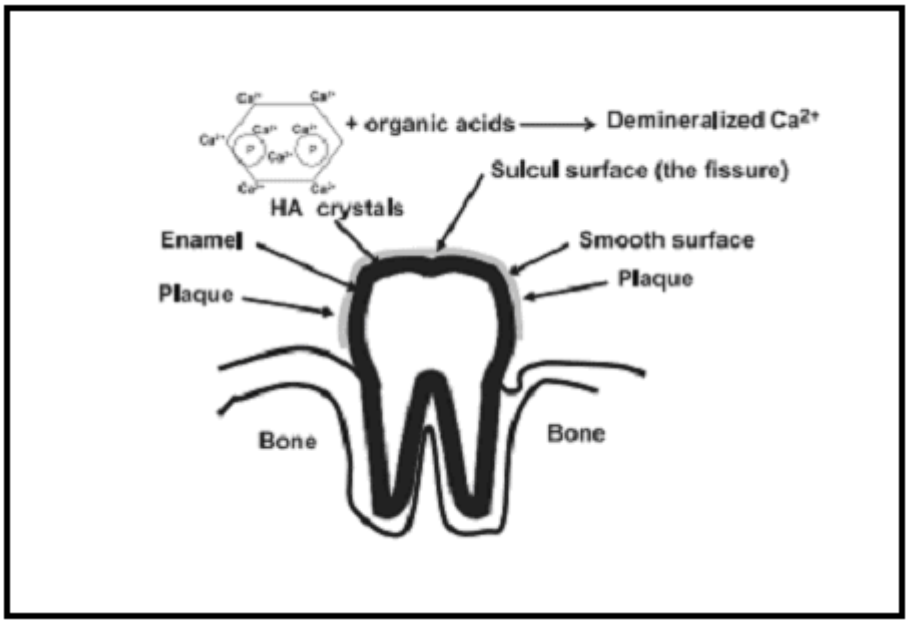

Figure 2. The complex interaction of cariogenic bacteria, plaque formation, demineralization, and cavity formation. From Aimutis WR (14).

Dental diseases such as dental caries, which is a localized destruction of the tooth (decay) resulting from bacterial fermentation of dietary carbohydrates. Certainly the etiologic factors, including microbial, genetic, immunological, behavioral and environmental, may interact to contribute to dental caries development.

Gingivitis, a bacterial infection of the gingival is leading to inflammation and bleeding, usually resulting form poor oral hygiene or diet. Periodontal disease, often arising

from gingivitis, where infection proceeds between the tooth and gingival margin forming a pocket that can reach the periodontal ligament securing the tooth to the bone.(15,16)

The prevalence of dental caries has been studied by many different researchers through the world. Prevalence of dental caries in the conducted researchers was found among 92%- 100% (17-21). Current percentages are not low. These rates require taking precautions. According to the results of current studies significant relationship between daily brushing, brushing at night and sugary food were found. High prevalence of dental caries could be decreases by promoting a healthy lifestyle, especially those concerned with encouraging healthy eating habits based on the food pyramid, increasing physical activity and improving access to oral healthcare. It needs to increase the public awareness of the oral and general health risks associated with excessive frequency of consumption of dietary sugar, clearer labeling of foods and appropriate marketing of high energy/sugary foods and drinks. It also needs to encourage all members to promote public awareness of the link between diet, oral health and general health (22, 23).

The Type of Beverages and Dental Caries

Bevereges are the important factors that affect the health of the teeth. Main studies have showed that there is strong evidence between sugared beverages and dental caries (24-32). Caries in the teeth of susceptible children have often been associated with frequent ingestion of fermentable sugars such as sucrose, fructose, glucose, and maltose. Diet counseling is an important adjunct to oral health instruction (33). Sugared beverages are typically high in energy and low in nutrients. Sugars contained in fermentable carbohydrates, such as milk, juice, and starches, are hydrolyzed by salivary amylase. This process leads to bacteria-producing acidic end products with subsequent demineralization of teeth and increased risk for caries on susceptible teeth. Consumption of regular soda pop, regular

powdered beverages, and, to a lesser extent, 100% juice in early childhood was associated with increased caries risk. Milk had a neutral association with caries (34-36).

High consumption of carbonated soft drinks by young children is a risk indicator for dental caries. Soda consumption nearly doubles the risk of dental caries in children. The acid in soda and other sugar-sweetened beverages causes erosion of tooth enamel, often after just one sip, and the sugar in these beverages provide fuel for the bacteria that cause tooth decay. Because diet beverages also contain acid, they too increase the risk for cavities (37-39).

Risk for caries can usually be minimized by eliminating Streptococcus mutans populations from the oral cavity, increasing the acidresistance of teeth, and control of the carbohydrate composition of the diet. Mechanical methods of plaque control, including brushing and professional scaling, are only temporarily effective in eliminating Streptococcus mutans. It could be reminded that, black tea exhibited strong antimicrobial effect against streptococcus mutans and lactobacillus bacteria. Consequently it is recommended as an effective natural beverage to combat dental caries. The control of plaque growth by chemical means has attracted considerable attention and chlorhexidine has been shown to be effective, although it causes discoloration of the teeth upon prolonged use. Water fluoridation has the potential to reduce oral health disparities by creating a healthy environment. Other forms of fluoride, such as fluoride toothpaste, and clinical interventions complement dental caries control strategies (40-42).

It could be concluded that, few intakes like black tea exhibited strong antimicrobial effect against streptococcus mutans and lactobacillus bacteria. Consumption black tea will protect the health of teeth. It is important to remember that person should stay away from carbohydrate foods, which include sugars and high consumption of carbonated soft drinks.

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