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REVIEW ARTICLE

Components of the diet and it relation to dental caries: A review

Snehal Sonarkar[1], Rucheet Purba[2], Shishir Singh[3], Rajesh Podar[4]

[1]Department of Conservative Dentistry and Endodontics, Vidya Shikshan Prasarak Mandal's Dental College and Research Centre, Nagpur, Maharashtra, India, [2]Private Practioner, Mumbai, Maharashtra, India, [3]Dean, Head & Professor, Department of Conservative Dentistry & Endodontics, Terna Dental College, Nerul, Navi Mumbai, India, [4]Professor, Department of Conservative Dentistry & Endodontics, Terna Dental College, Nerul, Navi Mumbai, India

Correspondence
Dr. Snehal Sonarkar, Department of Conservative Dentistry and Endodontics, Vidya Shikshan Prasarak Mandal's Dental College and Research Centre, Digdoh Hills, Hingna Road, Nagpur - 440 019, Maharashtra, India. Phone: +91-9967111642. E-mail: snehalsonarkar@gmail.com

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Abstract

Each and every living organism gets nutrition through diet. Diet contains various major components such as carbohydrates, vitamins, minerals, lipids and proteins. These major components of diet are further divided into minor ingredients. These minor ingredients play a significant role prevention or reduction in dental caries.

Keywords: Dental caries, diet, nutrients, nutrition

Introduction

Nutrition is defined as a condition of health that relates to the food and nutrient assimilation, its absorption and utilization. It is considered as an important factor in immunity and resistance to oral infections and systemic infections.[1]

In dentistry, the most important oral infection is dental caries and is found almost in every individual. To describe the process of dental caries, various theories have been postulated. These theories have stated about the mechanism of dental caries formation. These theories are Worm theory,[2] Humoral theory,[2] Vital theory,[2] Chemical theory,[2] Parasitic theory,[2] Chemo Parasitic theory,[2] Proteolytic theory,[2] Proteolysis Chelation theory,[2] Levine Theory[3] and Bandlish's theory.[3] All these theories have given their different mechanism of action and how dental caries is formed.

However, the current concept is that dental caries is a multifactorial disease in which there is interplay of three principle factors known as keys triad; host primarily being the saliva, microflora being bacteria and substrate being diet. The fourth factor being time (Newborn in 1982) was added in the keys triad and is also considered as the etiology of dental caries.

According to Nikiforuk primary factors for initiation of dental caries are bacterial plaque, suitable substrate and tooth.[3] The dental caries is a diet dependent infectious disease primarily attributed to the presence of oral bacteria. The prevalence and progression of this disease are further influenced by secondary factors, including saliva, fluoride, and the anatomic integrity of the tooth enamel.[4]

The evidence that links diet and dental caries are;[1] epidemiological evidence ([a] Tristan da Cuhna (South Atlantic) [b] Hopewood house study [c] Fructose Intolerance),[2] interventional human clinical study ([a] Vipeholm [b] Turku sugar study [Scheinin Makinen *et al.* 1975]),[3] Non-interventional human study[4] and animal study. Thus, all this studies have stated that there is a link between diet and dental caries. Diet consists of carbohydrates, vitamins, minerals, proteins, lipids, and other traces of elements.

Vitamins

Vitamins are any of a group of organic compounds that are essential for normal growth and nutrition and are required in

small quantities in the diet because they cannot be synthesized by the body.

These are essential molecules required by the human body. These molecules are organic and calorie free. They are further classified as fat soluble and water soluble. The functions of each vitamin are given in Table 1.

Proteins

Proteins are any of a class of nitrogenous organic compounds which have large molecules composed of one or more long chains of amino acids and are an essential part of all living organisms, especially as structural components of body tissues such as muscle, hair, etc., and as enzymes and antibodies.

Proteins are considered as building blocks of amino acids. They support growth of cells, produce antibodies and resist infections. These amino acids are further classified as essential and nonessential aminoacids. The amino acid lysine reduces rate of decalcification.

However, in case of protein deficiency the caries susceptibility increases as it reduces salivary flow rate, alters IgA levels and decreases antibacterial efficacy.

Minerals

They are naturally occurring, homogeneous inorganic solid substance having a definite chemical composition and characteristics crystalline structure, color and hardness. They are calorie free, essential molecules, but are inorganic, small elements that initiate many biological functions. The minerals such as iron, zinc and copper aids in collagen formation, Wound healing, and regulates inflammation. The effect of different minerals and its effect are given in Table 2.

Lipids

They are defined as any group of organic compounds, including the fats, oils, waxes, sterols and triglycerides that are insoluble in water but soluble in nonpolar organic solvents, are oily to the touch and together with carbohydrates and proteins constitute the principal structural material of living cells.

This lipid causes alteration of surface property of enamel by formation of fatty films by reducing contacts between carbohydrate food and bacteria. It shows antibacterial properties at low pH.

Other Substances

Cheese

It acts as antiacidogenic substance due to the presence of calcium lactate, casein and fatty acids. It increases salivary stimulation.

Table 1: Functions of vitamins in relation to dental caries

Type	Vitamin	Function
Fat soluble vitamins	Vitamin A	Forms oral epithelium
		Enhances immune system
		Wound healing
		Antioxidant
		Atrophic changes in ameloblast
		Decrease in number of salivary acini
	Vitamin D	Calcium and phosphate metabolism
		Builds skeletal bones and teeth
		Alveolar process support
	Vitamin K	Prevention of dental caries in incubated mixtures of saliva and glucose
	Vitamin E	Degenerative changes in muscles
		Changes in CNS
Water soluble vitamins	Vitamin B complex	Formation of new cells
		Cofactor for nutrients
		Pyridoxine alters oral flora thus decreasing caries causing organisms and finally decreases caries
		Niacin decreases susceptibility of caries
	Vitamin C	Aids in collagen formation
		Promotes capillary integrity
		Enhances immune response

CNS: Central nervous system

Table 2: Effect of different minerals on dental caries

Effect	Minerals
Cariostatic	Fluoride, phosphate
Mild cariostatic	Molybdenum, Galium, Sr, B, Li, Au, Fe
Caries inert	Ba, Al, Ni, Pd, Ti
Caries promoting	Se, Mg, Cd, Pt, Pd, Si

Tea *(Camellia sinensis)*[5]

It is a rich source of fluoride and is of green, black and oolong type. One cup of tea contains approximately 0.3-0.5 mg fluoride. The anticariogenic action of tea is that it is bactericidal on *Streptococcus mutans*. It inhibits bacterial adhesion, inhibits glucosyl transferase[6] and inhibits salivary amylase.[5]

Caffeine

It is a xanthene derivative also has anti-cariogenic activity, but dependence have been reported. The consumption of highly sugared caffeine beverages contributes to potential for rapid initiation and progression of caries in a multifactorial manner.

Conclusion

The mechanism of dental caries formation and its role with diet have been postulated decades ago. However, each and every component of the diet has a special role in the progress of dental caries. The role of each component in diet and its effect on dental caries has been mentioned in detail in the paper.

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