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Nutrition and Oral Health

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Introduction:

Nutrition is defined as a part of science dealing with nutrients that meet with our body for daily work process, repair and growth. Poor oral health can extremely reduce appetite and eating ability, which consecutively may lead to poor nutrition. Poor nutritional status may result in an impaired immune response to infection, wound healing, bad oral health, and, finally, ill-health. As we know, the main type of nutrients is macronutrients (carbohydrates, protein and fats) and micronutrients (vitamins and minerals). The first three are energy-producing nutrients i.e., calories and also help in generating energy. The latter three do not provide energy but help in other body activities. On the other hand, oral health plays a vital role in our life. Yes! The attractive smile, chewing ability and confidence**[**20**]**.

However the scenario is different, oral diseases are prevalent worldwide and the treatment is costly. We know that these two nutrition and oral health are interrelated. Mostly the oral diseases are related to our lifestyle and food intake. Nutrition deficiency can cause serious disease from the oral cavity to the

digestive tract. Most particularly protein-energy malnutrition. The quantities of nutrients that support good health are based on the approval of the two national committees of nutrition expertise. Committees, selected by the National Academy of Sciences and subjected to approval by the National Research Council, are Committee on Dietary Allowances and the Committee on Diet and Health. The first one focuses on nutrient and energy needs and health maintenance; the latter one mainly concentrates on lowering the risk of chronic diseases, deficiencies and dietary excess.

Definition:

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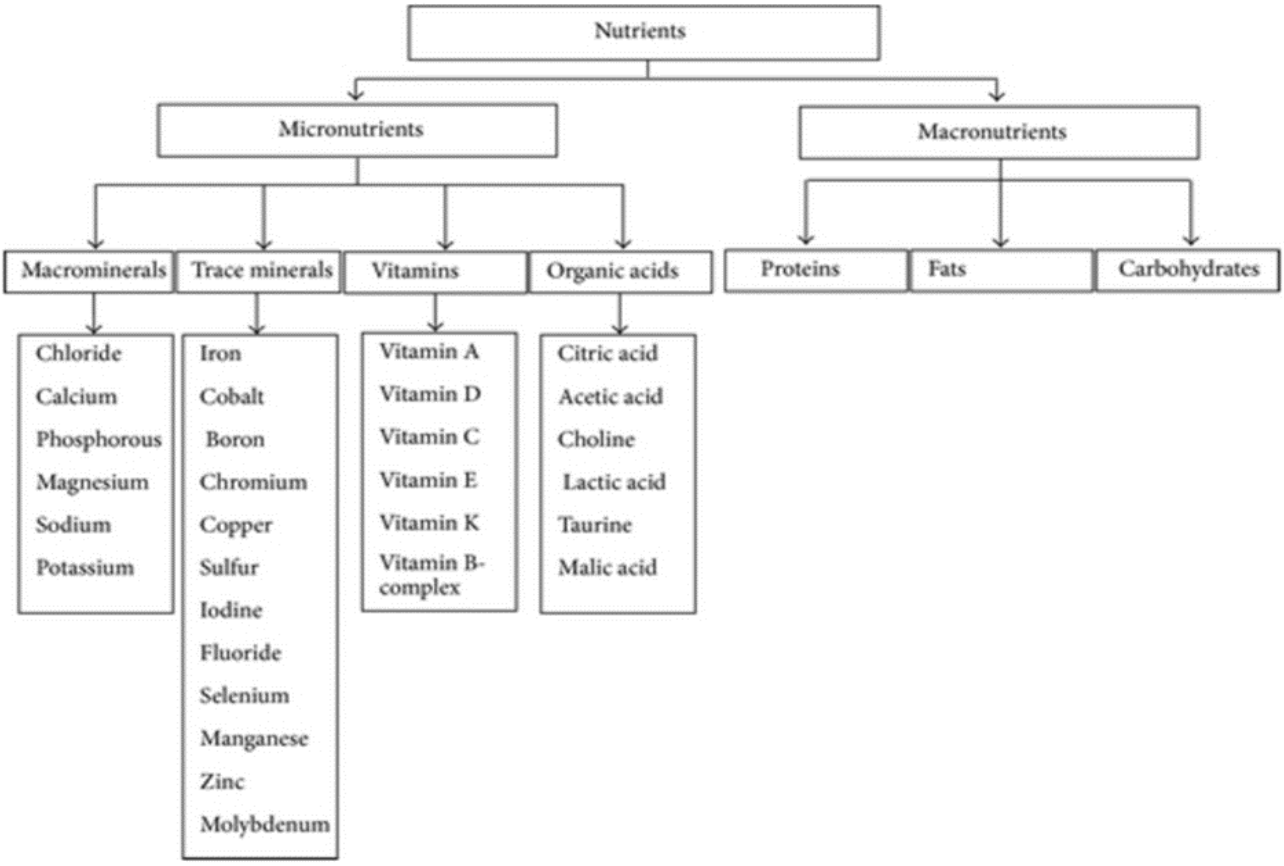
Nutrients Classification:



Vitamins and Oral Health:

- **Vitamin C:**

Vitamin C's role in maintaining the health of teeth and gingiva remains unchallenged. Now clinical evidence indicates that vitamin C functions in improving host defense mechanisms and is thereby implicated in preserving periodontal health. Common sense tells us that the monitoring of the vitamin C status of individuals, especially those at high risk (e.g., diabetics, smokers, elderly, etc.) for inadequate intakes, will yield positive results for periodontal health. **[**21**]**.

- **Vitamin D:**

Vitamin D has been shown to regulate musculoskeletal health by mediating calcium absorption and mineral homeostasis. Evidence has demonstrated that vitamin D deficiency may place subjects at risk for not only low mineral bone density/osteoporosis and osteopenia but also infectious and chronic inflammatory diseases. Studies have shown an association between alveolar bone density, osteoporosis and tooth loss and suggest that low bone mass may be a risk factor for periodontal disease [22]. Several recent reports demonstrate a significant association between periodontal health and the intake of vitamin D. An emerging hypothesis is that vitamin D may be beneficial for oral health, not only for its direct effect on bone metabolism but also due to its ability to function as an anti-inflammatory agent and stimulate the production of antimicrobial peptides **[**22**]**.

- **Vitamin A:**

Vitamin A is one of the earliest vitamins discovered and is an essential part of the nutrients. Deficiency of Vitamin A causes night blindness, xerophthalmia, keratoconjunctivitis, enamel hypoplasia, xerostomia, gingivitis, periodontitis and irregular dentinal tubular formation. Excess intake of Vitamin A results in angular cheilitis. Evidence is generated regarding the use of this vital nutrient in acute promyelocytic leukemia, oral leukoplakia and oral submucous fibrosis. This essential component must be routinely supplemented in the diet **[**24**]**.

- **Vitamin B complex :**

Effect of Vitamin B Complex On Oral Structures [23**] : Table 1**

Deficient Nutrient	Effect on oral structures
Vitamin B1(Thiamine)	Cracked lips, Angular cheilitis
Vitamin B2 (Riboflavin) Vitamin B3 (Niacin)	Inflammation of the tongue, Angular cheilitis Ulcerative gingivitis
Vitamin B6	Periodontal disease, Anemia Sore tongue Burning sensation in the oral cavity.
Vitamin B12	Angular cheilitis, Halitosis Bone loss, Hemorrhagic gingivitis Detachment of periodontal fibers Painful ulcers in the mouth

Minerals and Oral Health

Dental caries is a multifactorial disease (27). Diet, oral health and nutrition are interrelated. Epidemiological studies have supported the view that raised levels of calcium, phosphate, and fluoride in plaque might inhibit dental caries (28,29). It indicated that the organic acid produced in dental plaque is responsible for caries, but this is somewhat true because it is a complex effect of low pH, calcium, phosphate, and fluoride, which brought about minerals dissolution (30). The continuous elevation of fluoride in saliva and plaque fluid at low concentrations is necessary for maximum caries inhibition (31,32). In the case of diabetes, it is cognate with dryness of the mouth due to salivary dysfunction predisposing to dental caries (33,34). Acidic saliva with a low flow rate aggravates the process of tooth decay (35). (36-43) It has been told that the diets that contain dairy products (specifical cheese) are anti-cariogenic. Various theories for its effect have been described.

Dairy products might affect caries in different ways as they can reduce the critical pH of plaque by dispersing calcium and phosphate into plaque. Acid buffering and common ion effects may be present with fluoride, calcium, calcium lactate, calcium propionate, or phosphate. Dairy products may also trigger the secretion of salivary rate and its composition, therefore rising buffer capacity and oral clearance.

Antioxidants:

Antioxidants are substances that are capable of counteracting the damaging, but normal, effects of the physiological process of oxidation in animal tissue.

Free radicals and antioxidant therapy have attracted a great deal of attention in recent years. Antioxidants are compounds that destroy the free radicals in the body, thereby preventing harmful oxidation-reduction reactions. Antioxidants are critical for maintaining optimum health and well-being. The best sources of antioxidants are fruits and vegetables, which provide a variety of antioxidants such as Vitamins A, C, E, and carotenoids. Currently available data are compatible with the notion that these vitamins act as chemo preventives against some important cancers, e.g., carotenoids for lung cancer, ascorbic acid for salivary gland cancer, tocopherols for head and neck cancers, etc. Thus, a greater consumption of fruits and vegetables should be encouraged as they are the natural sources of these chemopreventive antioxidants along with other protective factors packaged by nature [25].

These are nutrients (vitamins and minerals) as well as enzymes (proteins in the body that assist in chemical reactions). There is increasing attention to the potential benefit of the use of antioxidants in the field of dental medicine. In general, antioxidants may be available through oral ingestion, diet or vitamin supplements, and nutraceuticals. In addition, treatment of oral and dental health problems may include drug-free, natural antioxidant remedies that are available in topical oral applications such as mouth rinse, gel, paste, gum, or lozenge compositions. These topical antioxidant remedies help reduce free-radical or reactive-oxygen species, which are causative inflammatory factors in the progression of gingival and periodontal maladies. This review focuses on relationships between antioxidants and free-radical/reactive-oxygen species in the oral environment[26].

New Frontiers:

Food-grade organisms like bacteria, molds and yeasts are the basis for a variety of biologically based industrial food processes (Kuipers, 1999). The fast-growing number of complete genomic sequences of organisms relevant to food research promotes the rapid increase invaluable knowledge that can be used in many different areas such as metabolic engineering, their benefit in general health, improvement of cells as micro process factories and the development of novel preservation methods.

Food is one of life's great delights. Modern science and technology have provided unparalleled value to consumers in the breadth of individual choices in delicious, safe and nutritious foods. This great value has been driven by scientific knowledge at all levels of the agricultural food chain from genetic improvements in production agriculture to food process engineering to precision in the analysis of consumer sensation. With its power to build detailed molecular knowledge of biological organisms, modern technologies are assembling the means to re-invent the food supply. In no other aspect of life do humans interface with other biological organisms to the same extent as in the consumption of food? Recent developments are highlighted in the use of nuclear techniques to evaluate biological interactions between food, nutrition, and health to move the agenda forward.

Conclusion:

Nutrition plays a vital role in a healthy lifestyle and more importantly in oral health. The dietary nutrients include carbohydrates, fats, proteins, minerals, vitamins and water. Nutrition is an integral component of oral health. Oral health is important for general health and quality of life. Dental caries still constitutes the most common oral condition worldwide. Epidemiological, as well as scientific data, suggests that there is a lifetime synergy between nutrition and integrity of oral health and disease. Nutrition and oral health have bidirectional harmonious relationships. Oral diseases, as well as acute, chronic as well as systemic diseases with oral manifestations, play a functional role in chewing ability as well as diet and nutrition status. Furthermore, diet and nutrition may affect the development and progression of oral diseases. Early diagnosis of disease symptoms and preventive measures are important for managing the disease. To control overall oral health, it is important to boost our knowledge regarding oral disease etiology and focus on oral health issues and preventive measures along with the control of diet and nutritional risk factors.

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