

Role of Nutrition in Oral Health

Aravindha Babu.N¹, Nishanth.G², B. Krishna Prasanth³, K.M.K.Masthan⁴

¹Professor, Department of Oral Pathology and Microbiology, ²Post graduate student. Department of Oral pathology and Microbiology, Sree Balaji Dental College and Hospital Bharath Institute of Higher Education and Research, ³BDS, M.Sc (Epid) COCPAR, Department of Oral Pathology and Microbiology, ⁴Professor and Head of the Department, Department of Oral pathology and Microbiology, Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research

Abstract

There is a mutually beneficial relationship present between the well being of oral tissues and nutrition in our body. The health of the oral tissues, the quality of saliva in mouth, the count of oral tissues and the extent of the taste relies on the consumption of nutrients. Oral health denotes the kind of food that has been taken and also the level of nutrients. A review of literary study was made to describe briefly about this mutually beneficial relationship.

Key Words: Oral Health, Vitamins, Malnutrition, Dentist.

Introduction

Nutrition is one of the way to study about how the food impacts over the human body. It is the necessary supply of water, vitamins, fiber, minerals etc. Many of the general health issues could be stopped and also prevented with the supply of nutrition. The World Health Organization stated that malnutrition is condition in which body's need of nutrition is not fulfilled hence failed to support growth, maintenance and some other specific functions¹. Malnutrition could be either deficiency or over abundance of it. The term nutrients are commonly denotes both macro and micronutrients. There is a continuous interaction present between condition of oral cavity and nutrition². Malnutrition may impact the formation of oral cavity and the advancement of oral problems via altered tissue homeostasis, decreased resistance to microbial biofilms and decreased tissue repair capacity³. Under the absence of additional contributing factors, settled nutritional status should be taken into account for patients with refractory

periodontitis, poor curing response to surgical procedures or repeatedly occurring oral disease. This is certainly true for aged sufferers and patients in institutional settings³⁻⁶. Nutrition impacts oral health and oral health impacts nutrition. This mutually beneficial relationship views better nutritional health causing good oral health and vice versa⁷. Nutrition is a greater factor in infection and inflammation⁸. Many reports stress out the continuous interactive relationship between malnutrition, easily spread diseases and the immune system. For example these infections in general encourages malnutrition, the malnutrition arouses the dysfunctions present in the immune system and this impaired immunity encourages and increases the easily spread diseases. In oral health, cavities, gum problems and many other diseases occurring in mucous membranes, tongue and salivary glands are infectious and not only breaks the strength of the oral cavity, but also impacts over common health¹⁰. Periodontal diseases, described by frequent inflammation and a decline of bone and soft tissues which spread around the teeth, one of the general frequent infections present in most humans⁸. A healthy nutritious diet which includes the necessary supply of vitamins, proteins, micronutrients and important fatty acids can play a vital role in resisting the easy spread conditions includes periodontitis^{8,9}.

Corresponding Author:

Dr. Aravindha Babu.N

Professor, Department of Oral pathology and Microbiology, Sree Balaji Dental College and Hospital Bharath Institute of Higher Education and Research (BIHER) Chennai.

Effect of Nutrition on Oral Health

Nutrition consumption affects the oral tissues in which the bacteria bind (i.e. teeth, epithelium, bone, collagen), and also the saliva⁸. Secretory proteins (mucin) present in the saliva creates a capable barrier in opposition to penetration, physical and chemical irritants, desiccation and bacteria¹⁰. Formation of glycoprotein such as mucin needs supply of vitamin A. Retinol deficiency can decrease the production of mucin, which leads to compromised flow of saliva, weakened tooth strength, and a significant increase in risk of cavities¹⁰. Malnutrition is also described by the increase in production and secretion of stress, hormones (glucocorticoid) and decrease in production of insulin⁴.

Increased levels of cortisol in malnutrition causes a same kind of change in the content of this hormone in saliva and gingival fluid. Elevated circulating glucocorticoid levels, even at physiological concentrations, elicit macrophage dysfunction and reduce the production of cytokines in response to inflammatory stimuli. Cytokines play an important part in differentiation, host defenses, tissue damage and growth. Cytokines prevent the chemokines and the other cells that are also involved in attracting the inflammatory cells at the place where inflammation present. This also mainly affects the tissue curing process⁹. The relationship which is most common between oral well being and poor habits of nutrition or deficiencies is observed in the pathogenesis of cavities.

There is a powerful connection between cavities and frequent intake of sugar and carbohydrates. A candida albicans infection has various factors of predisposition but the high diets of carbohydrates and folate or iron deficiencies have been thoroughly involved. Repeatedly occurring aphthous stomatitis which often is a milder condition, however worse cases maybe due to the deficiency of nutrition include B12 vitamin, iron and folate deficiencies. These deficiencies can also causes the atrophic glossitis or painful burning tongue at the end which is indicated by inflammation and defoliation of the tongue at the end. Dental erosion is the irreversible decline of the dental hard tissue caused by the chemical actions of acid dissolution but not connecting the bacterial plaque acid, and not openly connected with traumatic or mechanical factors or with tooth cavities. Erosion generally happens with attrition or abrasion.

Attrition maybe described as open tooth-to-tooth contact wear, whilst particles migrating opposite and reaching the surface of tooth which results in abrasion. It is found that the usage of soft drinks has an erosive potential, especially in age groups^{11, 12}.

Some of the alcoholic beverages such as cider and dry wine are also acidic^{13, 14}. Intake of alcohol is connected with gastric reflux and erosion may therefore be from both intrinsic and extrinsic sources¹⁵. Instead of the total consumption of these drinks may be, the repetition is more critical in the process of erosion. Fresh fruits, to be specific the citrus fruits have the potential of erosion similar to the pickled food items with the presence of vinegar. The fruit drinks given through a feeding bottle acts as a comforters and maybe harmful specifically to infant children. From those practices, severe dental destruction has been revealed¹⁶. There is a relationship present in between the periodontal issues and calcium consumption. Maybe this is happening due to the construction of density in the alveolar bone that holds the teeth. Calcium is essential for healthy tooth, bone growth, muscle compressions & expansions and extra functions. The role of vitamin C in the process of repairing a healthy connective tissue with its own antioxidant properties and maintenance activities tells about the relation between vitamin C and periodontal disease. The micronutrient fluoride is having a critical role in oral health. Fluoride addition process in public potable water supply is believed and rates as one among the top and effective preventive public health measures ever undertaken. Fluoride also decreases the tooth cavities by various mechanisms. The fluoride ion may become a part of enamel, which makes it more resistant to cavity. Adding to that, fluoride may control the movement of oral microbes, decreasing the generation of organic acids. Nutritional deficiencies can be having a largely affecting the function of oral cavity.

Taste sense may become changed. Normal food may taste bitter and bland. The saliva generation may be decreased and this can cause mastication and swallowing process as a severe painful one and difficult. This brings the malnutrition from inability to eat or loss of desire to eat food. Nutrient deficiency also induces the new indications and more extra oral health diseases. Medications for the management of systemic disease can also cause the malnutrition which stands as a proof for

oral health diseases. Let us say for example, potassium deficiency is frequently occurring due to diuretics in patients with higher rate of blood pressure. It also induces raw sensations, burning mouth and sore tongue while drinking, talking and eating. Potassium deficiency also induces the gingival bleeding. Consuming a good balanced diet is needed to maintain well being of tooth and oral health.

The next food options consists of chicken, nuts, meat, milk and cheese. The food items mentioned here are believed to be protect enamel by delivering the needed amount of phosphorous and calcium for the process of remineralization. Ending a meal with milk or cheese will neutralize intra-oral acid¹⁷. The additional food option consists of vegetables and strong/crunchy fruits (example, pears, apples etc). These foods contain high amount of water, which helps in dilution of sugar & its effect they have and also stimulates saliva to flow which supports to guard against decay by cleaning away the buffering acid and the food particles. Acid nature foods including citrus fruits such as orange, lemon and tomatoes should be consumed as a portion of a greater meal to reduce the acidic surroundings intraorally. The top beverage option consists of water (to be specific fluoridated water), milk and sugarless or unsweetened tea. Drinking sugar containing beverages should be restricted. These food items are having greater volume of sugar and/or they can be sticky to tooth, which could act as power source for bacteria. Adding to that cough syrups and drop should be consumed only at the needed time.

Effect of Poor Oral Health on Nutrition

Bad oral health can impact in the quality of diet and consumption of nutrient in a manner that possibly increases the risk of various systemic diseases⁷. Tooth loss can be the consequence in chewing troubles due to inadequate occlusive surfaces⁷. Lowered masticatory power changes the food choice and quality of diet, which could strike nutritional status¹⁸. Oral pain occurring due to cavities, advanced periodontal disease, soft tissue lesions or poorly fitting prostheses may also cause the modifications in diet and subsequent nutritional status⁷. Most of the studies related to tooth loss and nutrition indicates that nutrient consumption grows worse in quality with lesser teeth⁷. In a study, participants with maximum number of teeth have consumed lesser

calories, maximum vegetables fiber, carotene and fewer saturated fats, cholesterol, comparing to their other participants who got lesser tooth¹⁹. Among community-dwelling elderly, edentulousness is a critical risk for loss of weight, as chewing trouble or oral difficulty due to poorly fitting dentures can lead to dislike of food and decrease in nutrient consumption¹⁸. In addition to that it is also found that denture-wearing persons are consuming high amount of refined carbohydrates, sugar, cholesterol comparing to dentate persons⁷. Such harmful changes in food options may increases the danger of multiple systemic diseases. As masticatory efficiency becomes lowered, some individuals skipping food that are tougher to chew including stringy foods like beef or steak, crunchy foods like raw carrots, and dry, solid food like crusty bread. A person with lower chewing ability may over cook or prepare too fresh foods to change them much easier to intake. Wide array of nutrients are impacted by these activities, including food constituents which are crucial to prevent cancer and cardio attacks, and to protect cells and fight the indications of aging.

Conclusion

Malnutrition can worsen oral health and bad oral health could indirectly leads to malnutrition. To breach this harmful circle, good nutritional habits must be followed. Dentists should be held accountable for giving proper counseling to patients about diet and its relation to oral hygiene. Nutritional risk evaluation should be carried out during the starting phase and periodic dental examination. Supervising and follow-up should add periodic diet recall to assess counseling result. To gain the complete health of a person, oral health guidelines and queries about oral health troubles and the use of dental prostheses should be integrated into nutritional assessment protocol.

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References

1. WHO. Malnutrition The Global Picture. WorldHealthOrganization. <http://www.who.int/home-page/>. accessed on 26/04/09

2. Moynihan P. The interrelationship between diet and oral health. *Proc Nutr Soc* 2005; 64(4):571–580.
3. Lacopino AM. Maintaining oral health in the aging population: the importance of the periodontal-systemic connection in the elderly. *Grand Rounds Oral-Sys Med* 2006; 3:25–37.
4. Sheiham A, The relationship among dental status, nutrient intake, and nutritional status in older people. *J Dent Res* 2001; 80(2):408–413.
5. Walls AW, The relationship between oral health and nutrition in older people. *Mech Ageing Dev* 2004; 125(12): 853–857.
6. Hung HC, Willett W, Tooth loss and dietary intake. *J Am Dent Assoc* 2003; 134(9):1185-1192.
7. Ritchie CS, Nutrition as a mediator in the relation between oral and systemic disease: Associations between specific measures of adult oral health and nutrition outcomes. *Crit Rev Oral Biol Med* 2002; 13(3):291-300.
8. Mangan DF. Nutrition and oral infectious diseases: Connections and future research. *Compend Cont Educ Dent* 2002; 23(5):416-422.
9. Enwonwu CO, Nutrition and oral infectious diseases: State of the science. *Compend Cont Educ Dent* 2002; 23(5):431-434, 436, 438.
10. Mandel ID. Oral infections: Impact on human health, well-being, and health-care costs. *Compend Cont Educ Dent* 2002; 23(5):403-413
11. Millward A, Continuous monitoring of salivary flow rate and pH at the surface of the dentition following consumption of acidic beverages. *Caries Res* 1997; 31:44-49.
12. Millward A, The distribution and severity of tooth wear and relationship between erosion and dietary constituents in a group of children. *Int J Paed Dent* 1994; 4:151-157.
13. Rees JS, An in vitro assessment of the erosive potential of some White wines. *Eur J Prosthodont Rest Dent* 2002; 10:37-42.
14. O’Sullivan EA, Dental erosion associated with the use of ‘Alco pops’- a case report. *Br Dent J* 1998; 184: 594-596
15. Robb ND and Smith BGN Dental erosion in patients with chronic alcoholism. *J Dent* 1989; 17:219-221
16. Smith AJ, Baby fruit juice and tooth erosion. *Br Dent J* 1987; 162:65-67.
17. Gedalia I, Tooth enamel softening with a cola type drink and rehardening with hard cheese or stimulated saliva in situ. *J.Oral Rehab* 1991; 18:501-506.
18. Ritchie CS, Oral health problems and significant weight loss among community-dwelling older adults. *J Gerontol* 2000; 55(7): M366-371.
19. Joshipura KJ, The impact of edentulousness on food and nutrient intake. *JADA* 1996; 127(4):459-467.