

Role of Nutrition in Orthodontics

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Abstract

The objective of a proper diet is to achieve and maintain a desirable body composition and a high potential for physical and mental work. Orthodontic treatment involves the use of attachments and force element that can negatively affect the dietary intake, compromising the nutrition of the patient. Orthodontic patients avoid many types of food, particularly fruits, raw vegetables, and other hard and tough foods, as they cannot chew these properly because of pressure sensitivity of the teeth in the initial 3–5 days period after routine. As a result, such individuals consume significantly less proteins and other key nutrients, fiber, calcium, iron, and some vitamins. This article presents the nutritional guidelines to obtain good oral and general health in orthodontic patients are discussed.

Keywords: Diet, Nutrition, Oral health, Vitamins

INTRODUCTION

Nutrition is “The science of food, the nutrients and other substances therein, their action, interaction and balance in relation to health and diseases and the processes by which the organism ingest, digest, absorbs, transports, utilizes and excretes food substances.”^[1] Nutrients are divided into macronutrients and micronutrients. Vitamins are required in small quantities and which generally cannot be synthesized by the body and therefore be supplied by the diet. A good diet plays an important role in maintaining good health.^[2,3] 1987 guidelines for accreditation of dental schools by the American Dental Association require that “the graduate must be competent to provide dietary counseling and nutritional education relevant to oral health.” Study of diet and nutrition is also a mandatory part of curriculum in Indian dental schools. A balanced diet helps to prevent disease, weight control, and proper sleep. Balanced diet is also important because it enables to meet daily nutritional needs and enjoy a higher overall quality of life.^[4,5]

The orthodontic treatment ranges from dealing with growth and development of craniofacial complex to the movement of teeth. Orthodontic treatment and diet have a strong relation. Our periodontal status, oral index, immune response and growth determine by diet. Orthodontic treatment affects the intake, and consistency of food.^[2,6]

Orthodontic treatment generates physiologic as well as psychological stresses, which levy additional nutritional

requirements already hiked by the stresses, activities and growth during adolescence. Fixed orthodontic treatment typically lasts for around 1½–3 years and, during this dietary restrictions and modifications are suggested.^[7]

MALOCCLUSION AND NUTRITION

In many literature dietary deficiencies are etiology of dentofacial deformities.^[8,9] Nutritional deficiencies alter the functioning of body which effect not only the growth and development but also the dentition.^[10] There is relation between nutrition and growth and the development.^[11] Due to nutrition deficiency reduction of skull base length, maxillomandibular width and lower facial height occurs. Altered growth of facial bones lead to insufficient space for teeth to erupt resulting in crowding, impactions.^[11]

EFFECT OF NUTRITIONAL STATUS ON TOOTH MOVEMENT

Orthodontic treatment depends on the biologic response of the periodontal ligaments and the alveolar bone. Ascorbic acid influence the biologic response to the orthodontic forces. The

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effect of ascorbic acid is based on the lack of it interferes with the collagen synthesis by preventing hydroxylation of proline to hydroxyproline, thus affecting both the periodontal ligament and the formation of osteoid.^[12,13]

ORTHODONTIC TREATMENT AND NUTRITION

In orthodontic treatment sticky, gummy, chewy or very hard food may lead to appliance breakage and bracket debonding.^[14] Soft diet during orthodontic treatment lead to reduced fiber and carbohydrate intake and increase in intake of fats. Which may lead to reduction in copper and manganese.^[14] The vitamins and minerals are actively involved in normal growth and development. Vitamin A deficiency lead to protein deficiency which result in inadequate bone growth with malocclusion of teeth while Vitamin A excess and Vitamin D deficiency causes skull softening, decreased calcium deposition and also increase risk for cleft lip and palate.^[15,16] Vitamin D play major role in metabolism of calcium and phosphorous which are required for skeletal and dental growth. Vitamin D deficiency causes rickets, closure of facial sutures is affected leading to open bite, transverse hypodimension and misshapen palate. Magnesium deficiency may lead to habit of bruxism.^[17] Copper is required for hemoglobin and red blood cell production. Manganese play important role in bone remodelling and glucose metabolism.^[18]

EFFECT OF NUTRITION ON ORTHODONTIC TREATMENT

The orthodontic therapy is dependent on the good health of oral tissues. Ulcerations, inflamed oral tissues and compromised periodontal tissues negatively affect the orthodontic therapy. Hence, the quality of food directly affect orthodontic therapy.^[7]

DENTAL DECAY

The sticky foods and improper oral hygiene leads dentition towards dental caries. Topical Fluoride application helps to prevent dentition from dental caries by conversion of hydroxylapatite crystals of enamel into less acid soluble fluorapatite. However, excess fluoride may lead to dental fluorosis characterized by brownish and corroded appearance of teeth.^[7]

DEMINERALIZATION

Excess sugar consumption, inadequate oral hygiene causes decalcification of teeth. It is usually under the bands and brackets. According to different studies, measurable demineralization found gingival to bands and brackets in a period of 4 weeks.^[19]

ROOT RESORPTION

Prevention of root resorption is an important challenge in orthodontic therapy. Diet may influence root resorption.^[7] Deficient diets cause root resorption as compared to adequate diets as seen through many animal studies.^[20,21] Vitamin D helps

to maintain calcium phosphorous balance but its deficiency leads to cemental resorption.^[22,23]

EFFECT OF NUTRITION ON BONE HEALTH

Calcium phosphorous ratio should be greater than 1 for proper bone health. Due to orthodontic treatment, this ratio was found to be less than 1. Cause of it as consumption of phosphorous rich soft drinks and fast foods with avoidance of calcium-rich dairy products.^[7,24,25] Due to Vitamin C deficiency large resorption lacunae and increased osteoclastic activity observed.^[7,24] This jeopardizes bone remodeling, which affect orthodontic tooth movement.^[7]

PERIODONTAL PROBLEMS

Nutritional deficiencies may lead to gingivitis or periodontal pocket, local irritants on the periodontium.^[26] Vitamins are important to maintenance of periodontal health. Vitamin A deficiency causes keratinizing metaplasia of the epithelium, thus, increasing vulnerability to infections.^[27] Lack of Vitamin B causes gingivitis, glossitis, angular cheilitis, and oral mucositis.^[28] Folic acid deficiency may lead non-inflammatory necrosis of gingiva, periodontal ligament, and alveolar bone.^[7]

BRACES FRIENDLY EATING TIPS

During orthodontic treatment, it is important to avoid certain foods that can damage the orthodontic appliances, brackets, and wires, which may lead to delays in treatment.^[5] During orthodontic treatment, patients are advised to follow stop (Never Eat), halt (Use caution, cut up and chew with back teeth) and go pattern of food consumption.^[7]

STOP (NEVER EAT)

Chewing gum, caramel, toffee and all sticky candy, ice cubes, popcorns kernels, raw apple or carrot, corn on cob, hard pretzels, pizza crust, chocolate chips, nuts.

HALT (USE CAUTION, CUT UP AND CHEW WITH BACK TEETH)

Nacho Chips, Bagels, Ribs, Chicken Wings, Raw Vegetables, Hard Fruit, crusty bread, high sugar foods.

Go

Ice Cream (no nuts), Potato Chips, Steamed Vegetables, Pasta Potatoes, French Fries, Yogurt, Pudding, Jelly, Soup, Cereal in Milk, Cheese, Eggs, Milkshakes.

CONCLUSION

In orthodontic therapy essential elements to keep the oral tissues healthy and aid in bone, remodeling is a well-balanced diet. Dietary guidance to orthodontic patients in choosing soft food diets may beneficial for physiologic response to

orthodontic treatment. It also provides maximum comfort to the patient while administering orthodontic treatment. Nutrition goals for the orthodontic patient should be to eat a variety of foods including protein sources, dairy food, fruits, and vegetables.

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