

Managing Nutrition but Not Damaging the Orthodontic Attachments: A Consideration

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ABSTRACT

The importance of nutrition management in an orthodontic treatment is unfathomable as it eliminates the chances of damage to the orthodontic appliance. It is not only convenient for the orthodontist but also beneficial for the oral health of the patient undergoing treatment. A dietary list should be provided by the orthodontic practitioner which is crucial for a successful treatment. The balanced intake of nutrients like carbohydrates, vitamins, calcium, iron, zinc, magnesium, and fluoride are discussed below.

Keywords: Diet, Nutrition, Orthodontics

INTRODUCTION

The orthodontic treatment aims to enhance facial appearance, oral health and oral function by correction of dentofacial complex. This deals with growth and development of craniofacial complex including teeth and periodontium to bring about changes for correction of disharmony of jaws and teeth. Nutrition plays a pivotal role in the overall growth of various tissues, immune response, healing potential, periodontal response to various stimuli, oral flora etc., thereby affecting the outcome of orthodontic treatment.¹

Fixed orthodontic treatment lasts for around 1½ to 3 years which requires a range of attachments and force elements, thereby enabling the patient to cut down on gummy, hard to chew or very hard food to avoid appliance breakage and bracket debonding. These patients generally switch over to easy to eat food without any special consideration to the nutrient values. A good diet is very important in maintaining good oral and overall health.² According to T. Collin Campbell “everything in food works together to create health or disease.”

According to 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.”⁵

Guilford was one of the early pioneers who proposed that dietary deficiency as an etiology of dentofacial deformities.⁶ Overall and oral health is highly affected by nutritional deficiencies. Studies have shown that off-springs of animals with increased chances of cleft lip and palate are those who were on diet lacking zinc, riboflavin, folic acid.⁷ Nutritional deficiency can also lead to malformation of skull base length, lower facial height and maxillomandibular width.⁸ Earlier studies have shown that patients on soft diet generally exhibited inchoate muscles of orofacial

region resulting in narrow arches. The key nutrients essential for maintaining a good oral hygiene in orthodontic patients are as follows:

CARBOHYDRATES

Carbohydrates mainly include fibers, sugars and starches. Orthodontists instruct patients not to eat very hard, sticky and chewy food to avoid bracket debonding.⁹ Reduced intake of fibers decreases the use of masticatory muscles, which can lead to retarded jaw size resulting in narrow arches, shorter and thinner condyles.³ Diet with rice and potatoes contains carbohydrate which can be consumed by patients undergoing orthodontic treatment. In order to prevent breakage of braces, the patient should consume a diet rich in carbohydrates like rice and potatoes. Diet rich in sugar and starch can easily lead to more amount of dental plaque formation. Plaque contains mucin, glycoproteins, and bacteria that adheres to the teeth surface and orthodontic appliances. Sugar intake should be omitted in patients undergoing orthodontic treatment as it is considered as a major factor in plaque formation and also contributes to dental caries and periodontal diseases.¹⁰

VITAMINS

Vitamins are essential micronutrients that are needed for maintaining oral and overall health. Unfavorable skeletal defects like retarded jaw and decreased condylar growth are often seen with vitamin A and vitamin D deficiency.¹¹ Vitamin A, D and C are important for optimal calcification of teeth.

Vitamin A is a fat soluble vitamin usually found in diet rich in eggs, capsicum, liver, cod liver oil, broccoli, sweet potato and leafy vegetables. (RDA =900 µg/day). Deficiency of Vitamin A causes epithelial keratinizing metaplasia and thus increases the vulnerability to infections.¹²

Vitamin B has a significant function in cell proliferation, healing and metabolism. Lack of Vitamin B affects the oral cavity causing gingivitis, angular cheilitis and oral mucositis.¹³

Vitamin C influences tooth movement and is important for collagen synthesis and osteoid formation. Scantiness of Vitamin C directly influences periodontal ligament and gives way to augmented endosteal and periosteal spaces with considerable osteoclastic activity. Vitamin C is also very important for post orthodontic retention treatment and deficiency of vitamin C often leads to relapse.¹⁴

Vitamin D is an essential nutrient that increases the assimilation of minerals such as calcium, magnesium, iron, phosphate and zinc in the intestinal tract. Vitamin D aids in the metabolism of calcium and phosphorous which are some of the essential minerals necessary for skeletal and dental growth. Vitamin D deficiency is the main reason for rickets and maxillary dysplasia and leads to periodontal inflammation¹⁵⁻¹⁷. Orthodontic tooth movement can be accelerated by intraperitoneal injections of vitamin D₃¹⁸⁻¹⁹.

Vitamin K is a group of fat soluble vitamins required that play an important role in blood clotting, regulating blood calcium levels and forms the requisite protein necessary for bone metabolism for example osteocalcin and periostin. Vitamin K deficiency is the primary reason for gingival bleeding.⁴

DIETARY MINERALS AND TRACE ELEMENTS

Calcium

Calcium is the most abundant mineral in the body and is essential for the formation of calcified tissues such as bone and teeth. Adult human consists of 1.0 to 1.2 kg of calcium. Calcium is

found in diet rich in dairy products, leafy vegetables, nuts, and seeds. Deficiency of calcium causes an impact to periodontal health. Calcium supplements along with vitamin D has a positive effect on periodontal therapy.⁴

Magnesium

Magnesium is essential for bone formation and cell metabolism. Magnesium deficiency interferes with the parathyroid hormone resulting in osteoporosis.²⁰ Bruxism is common with magnesium deficiency. Magnesium overdose increases bone mineral density. In osteoporotic patients, magnesium reduces the incidence of fracture showing a positive effect of magnesium on bone.²¹⁻²²

Iron

Iron is the most abundant trace element found in human body. The human body requires 4 gm of iron for the synthesis of proteins including hemoglobin and myoglobin. Dietary sources of iron include spinach, beans and red meat. Deficiency of iron causes anemia and can lead to oral manifestation such as pale mucosa and recurrent ulcerations.⁴

Zinc

Dietary sources of zinc include protein rich foods. Dietary zinc is essential for maintaining good periodontal health and deficiency of dietary zinc worsens periodontal health in patients with type 2 diabetes mellitus. In osteoporotic rats, studies have reported enhancement of osseointegration around zinc-coated dental implants.²³

Fluoride

Fluoride is essential for the formation of fluoroapatite which is important for strengthening enamel and cementum.²⁴ Fluorides can be administered via water or milk (RDA=0.25 to 1 mg per day) In orthodontic patients, excess fluoride supplements can result in root resorption caused by orthodontic teeth movement.²⁵

Patients undergoing orthodontic treatment are subjected to orthodontic forces which are essential for tooth movement and this in turn increases irritation to the periodontium and also increases physical and emotional stresses, increasing the nutritional requirement. Proper instructions must be provided to the patients by their orthodontist to maintain a proper oral hygiene and to avoid unnecessary breakage of orthodontic attachments such as bands and brackets.²

Epileptic orthodontic patients with anticonvulsant induced osteomalacia can show increased osteocytes and osteoclasts resorption which can be corrected by Vitamin D therapy.

Proper diet education starts by properly instructing the patient what is consumable and what is not consumable to avoid breakage of orthodontic attachments.

Non consumable	Consumable
Chewing gum	Potato chips
Caramel	Boiled vegetables
Sticky candy	French fries
Ice cubes	Yoghurt
Popcorn kernels	Rice, chapattis, bread
Raw apple or carrot, corns	Soup
Meats	Cereals in milk
Pizza crust	Cheese
Chocolate chips	Eggs

Nuts	Milk
Carbonated drinks	Ice creams

CONCLUSION

Proper dietary instructions by an orthodontist plays a key role in successful orthodontic treatment. Educating a patient undergoing orthodontic treatment about his/her diet can lead to less breakage of orthodontic attachments which is the most common mishap encountered by every orthodontist. A soft and healthy diet with all the essential nutrients is necessary for maintaining a good overall oral health and also eliminates the number of appointments which require breakage repair.

Good oral hygiene and diet have a synergistic effect in curbing the tedious orthodontic repairs.

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