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# Nutritional Status In Denture Wearers: A Review

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## Abstract

The relationship among dentition status, masticatory function and nutrient intake is of importance. Dietary factors are related to the cause and prevention of important diseases, including cancer, coronary heart disease, cataracts. Elderly denture wearers are vulnerable to compromised nutritional health due to various factors including: physiologic, psychosocial, oral, functional, medical and dietary supplementation. Dietary guidance is an integral part of treatment for denture wearers. An overview of the relationship between denture wearers and malnutrition and the nutritional strategies to obtain good oral and general health in denture wearers are being discussed.

## INTRODUCTION

A large segment of the elderly more than one-third of those aged more than 65 years are edentulous.<sup>1-3</sup> The relationship among dentition status, masticatory function and nutrient intake is of importance. The effect of edentulous state on nutritional and health status is an important but overlooked public health issue.<sup>4</sup> The wearing of complete denture may have adverse effect on the oral health and the denture supporting tissues. Diets containing fewer vegetables and less carotene and fiber are associated with increased risk of cancer and heart diseases. The reduced masticatory ability may lead to changes in dietary selection with risk of an impaired nutritional status especially in elderly complete denture wearers.<sup>1</sup> A review of the nutritional requirements, symptoms of malnutrition, factors that influence the food choices is being presented.

## REVIEW

### IMPACT OF ORAL HEALTH ON NUTRITION IN DENTURE WEARERS

Oral health status is an important factor for nutrition. There is a clear potential for the condition of the mouth and teeth to have an adverse affect on nutrition. According to studies, one in five older people reported that oral condition prevented them from eating the foods they would choose, 15% took longer time to complete their meal and their enjoyment of food was limited by oral condition, 5% avoided eating certain foods because of chewing problems.<sup>5,6</sup>

Although the increase in health risks due to tooth loss may be small, the implications could be great, as a large segment

of the population is affected. The risk factors for malnutrition in patients with dentures include: loose denture, sore spots under denture, severely resorbed mandible, difficulty in chewing, eating less food, unable to arrange food for oneself, unexpected excessive weight gain or weight loss, alcohol or drug abuse, and undergoing chemotherapy or radiation therapy.<sup>5-7</sup>

The sequelae of treatment with complete denture may have adverse effects on the health of both oral and denture supporting tissues. The effects can be direct or indirect. The direct sequelae include: denture stomatitis, denture irritation, hyperplasia, traumatic ulcer, flabby ridges, residual ridge resorption, mucosal ulcerations, altered taste perception, burning mouth syndrome and gagging. Indirect sequelae are related to reduce chewing ability with an overall reduction in the functional capacity and general health. Further inadequate diet can lead to reduced tolerance of the tissues to normal wear and tear and this reduced resistance, in turn, can result in poor adaptation to dentures.<sup>6-9</sup>

### FACTORS THAT AFFECT DIET AND NUTRITIONAL STATUS

The effect of dentures on nutritional status varies greatly among individuals.<sup>7-9</sup> Oral impairments affect diet and nutrition due to changes in the ability to taste, bite, chew and swallow foods. Dentures affect the chewing performance adversely. The elderly people tend to use more strokes and chew longer to prepare food for swallowing. According to a recent study, masticatory efficiency in complete denture wearers was approximately 80% lower than in people with

intact natural dentition.<sup>10</sup> In comparison with the subjects wearing mandibular implant-retained over-dentures, the subjects with conventional complete dentures needed between 1.5 and 3.6 times more chewing strokes to achieve an equivalent reduction in the particle size.<sup>11</sup>

Taste sensitivity may be reduced and it is difficult to locate the food in the mouth when the upper palate is covered as in case of full upper denture and these problems are further increased in cases of complete denture wearers. When compared to the sensory perceptions of dentate adults or partial denture wearer, subjective estimates of taste, texture acceptability of test foods and ease of chewing in complete denture wearers were the lowest.<sup>8</sup> The inability to distinguish the sensory qualities of food reduces patient's enjoyment of eating and leads to reduced calorie intake.

The comfort of wearing denture is dependent on the lubricating ability of saliva in the mouth. Xerostomia can also impair complete denture retention and is associated with difficulties in chewing and swallowing which can adversely affect food selection and contribute to poor nutritional status. Problems in lubricating, masticating, tasting and swallowing food contribute notably to the complex physiological and psychological manifestations of aging.<sup>6,12</sup>

Rhodus and Brown in a study of 67 older adults from institutionalized and free living geriatric population having xerostomia on sialometry reported that statistically significant inadequacies in the nutritional intake patterns. Subjects with xerostomia had significant deficiencies of fiber, potassium, vitamin B-6, iron, calcium and zinc. Taste and food perception were significantly reduced in elders with xerostomia.<sup>12</sup>

In a study done Locker in older adult population, almost one-fifth participants reported dryness. These cases also complained of other oral symptoms such as unpleasant taste, a burning sensation in the tongue and other parts of the mouth and pain from dentures, difficulty in chewing food. Similar problems associated with dryness of mouth were also reported by other authors.<sup>5</sup>

Research also indicates that loss of natural teeth cause reduced masticatory efficiency even after replacement with dentures.<sup>13-15</sup> The reduced masticatory ability may lead to changes in dietary selection with risks for an impaired nutritional status.<sup>1</sup> Some people compensate for declined masticatory ability by choosing processed or cooked food rather than fresh foods. Others may eliminate certain food

groups from their diets. There is good evidence that people adapt to tooth loss by altering their dietary intake to compensate for the increased difficulty of eating certain foods, even if masticatory function is restored with conventional dentures.<sup>14-16</sup> Masticatory status thus influences the appearance of gastro-intestinal disorders.<sup>17</sup>

Papas et al reported that people with full dentures consumed fewer calories and lower levels of several specific nutrients than did those who had partial dentures or natural dentition.<sup>15</sup> Greksa et al concluded that full-denture wearers consumed significantly lower levels of vitamin A and C than did dentate people.<sup>18</sup> Norlen et al stated that edentulous women had higher intake of fat and higher coffee consumption than dentate ones.<sup>9</sup>

The elderly edentulous avoid many types of food, particularly raw vegetables and other hard and tough foods, because they cannot chew these with conventional dentures.<sup>14,19</sup> As a result such individuals consume significantly less proteins and other key nutrients, fiber, calcium, non-haem iron and some vitamins as compared to the dentate individuals.<sup>20</sup> The hard and coarse foods such as fruits, vegetables and meat, which are typically major sources of vitamins, minerals, proteins and fiber, are difficult to chew with conventional dentures. Depending on the degree of impairment, chewing difficulty may result in a shift in food selection patterns.<sup>13,16</sup>

Various studies have implicated dietary factors in the cause and prevention of important diseases, including cancer, coronary heart disease, cataracts.<sup>21</sup> The biochemical measures of plasma ascorbate and plasma retinol is related to dental status. However, dental status is not significantly associated with histological and biochemical measures for the other key nutrients for which intake values vary with oral health.<sup>22,23</sup> The relationship between dental status and vitamin C appear to be both real and potentially important to general health. These lower levels of plasma ascorbate and plasma retinol could disturb thin skin and eye sight. Decrease in vitamin C can be associated with cataracts.<sup>20</sup>

Studies show that edentulous older men have a significantly higher prevalence of type II diabetes than dentate or partially edentulous men. Edentulous men had significantly lower consumption of fruits, vegetables and fiber compared with dentate men and that edentulous women had higher fat consumption as compared with dentate women.<sup>24</sup> Decrease in fiber consumption can lead to increased risk of colorectal adenoma. Diets containing fewer vegetables and less

carotene and fiber are associated with increased risk of cancer and heart diseases.<sup>21</sup> Poor oral function thus, is a risk factor for gastrointestinal pathology.<sup>16</sup>

The risks for cardiovascular disease are also increased in edentulous patients. Johanansson et al compared the dietary intake and the levels of traditional cardiovascular risk factors in edentulous middle-aged individuals and individuals of the same age and sex with natural teeth. They reported that energy intake did not differ in two groups but edentulous men and women ate more sweet snacks compared to those with teeth. Further edentulous men and women were more obese and had lower serum HDL- cholesterol concentrations. The authors supported the hypothesis that edentulous middle-aged individuals have more unfavorable risk factors for cardiovascular disease.<sup>24</sup>

### NUTRITION GUIDELINES

Dietary guidance, based on the assessment of the edentulous patient's nutrition history and diet, should be an integral part of comprehensive prosthodontic treatment. The great majority (70% to 80%) of edentulous patients has also acknowledged the benefit of complete denture treatment and declared themselves satisfied with their dentures.<sup>25-27</sup>

According to Geertman et al the masticatory muscles respond to the stimulus received. The sensitivity achieved by over-dentures can guarantee and integrate muscle reaction, which makes it possible to chew food more effectively. The clinical evidence in this study suggests that the ability to chew mainly tough food depends on the retention offered by implants placed in the lower jaw.<sup>11</sup> Davis<sup>28</sup> and Merickse-Stren<sup>29</sup> added that over-dentures are clearly indicated for elderly patients that had lost their functional ability or when they had not been able to adapt to a complete denture in the lower jaw. Further replacing complete denture with osseointegrated implants results in significant improvement in the masticatory function.<sup>29</sup>

To improve diet quality, individual patients undergoing prosthodontic treatment need dietary counseling. The main objective of diet counseling for these patients is to correct imbalances in nutrient intake that interfere with body and oral health. This include obtaining a nutrition history, evaluating the diet, educating the patient about diet components important for oral health, motivating the patient to improve diet, and follow up to support patient efforts to change food behaviors.<sup>5,9,21,24</sup>

Patients with dentures who prefer soft foods such as

doughnuts, cake, pastries and cookies, which are high in simple sugars and fat, should be advised regarding the value of fruits, vegetables, grains and cereals in their regular diet. An important component of complex carbohydrates is fiber, which promotes normal bowel function, lower glycemic response, may reduce serum cholesterol, and is thought to prevent diverticular disease.<sup>1,21</sup>

Vitamin-mineral supplements without energy or fiber may foster a false sense of security in the patients. Older adults often select a supplement that does not include nutrients most likely to be missing in their diet. Nutrition goals for the denture-wearing patient are to eat a variety of foods, including protein sources, dairy food, fruits, vegetables, grains and cereals and to limit salt, fat and sugar intake. Consumption of water, juice and milk should be encouraged<sup>9,16</sup>.

Compliance with dietary advice is more likely if follow up is provided. Dietary progress should be discussed at future appointments. Such nutrition care should be an integral part of the overall prosthodontic treatment.

### SUMMARY

Denture wearers can be at a risk of poor nutrition for a variety of reasons. The dentist should be aware of nutritional risk factors and provide nutritional guidance to the patients to adapt rapidly to well balanced diets. Comprehensive health care of the denture wearers requires thoughtful communication and coordination of services. This complexity demands that dentists, not in isolation, but dieticians should be consulted to ensure a good nutritional health and effective care.

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