

## Nutritional Considerations in Geriatric Patients with Dentures: A Comprehensive Review

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### Abstract:

Health is a fundamental pursuit across all ages, and optimal nutrition is essential in achieving and maintaining it—especially in the elderly. Aging is associated with numerous physiological, psychological, and social changes that can impact nutritional status, either directly or through factors such as medication use and oral health decline. Edentulism and reduced masticatory efficiency often lead to compromised dietary intake, increasing the risk of malnutrition. Prosthodontic interventions, including complete dentures and implant-supported prostheses, aim to restore oral function, yet alone they are insufficient in significantly improving nutritional outcomes without integrated dietary counselling. A multidisciplinary approach that combines prosthetic rehabilitation with nutritional guidance is essential for promoting overall health in geriatric patients. This review article highlights the changes in diet associated with ageing and the importance of nutrition among elderly wearing complete dentures.

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### I. Introduction

The pursuit of perfect health has been a constant across all ages, with nutrition playing a pivotal role in maintaining systemic and oral well-being, especially among the elderly. As life expectancy increases due to medical advancements, the quality of life during geriatric years remains a concern, largely due to physiological changes that heighten susceptibility to chronic diseases—many of which are linked to malnutrition. Oral health is an integral part of overall health, and in older adults, edentulism and diminished masticatory function often lead to compromised dietary intake. While prosthodontic interventions aim to restore oral function, their success is closely tied to the nutritional status of the patient. A thorough understanding of age-related changes, systemic health, socioeconomic factors, and dietary habits is essential for dental professionals to provide effective and individualized care. Integrating dietary guidance into prosthodontic treatment planning is crucial for improving both oral function and overall health outcomes in the aging population. [1,2]

**What is Malnutrition?** Malnutrition is defined as “a state of nutrition in which a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue/body form (body shape, size and composition), function and clinical outcomes.

#### Nutrition and Age

1. To establish a balanced diet which is consistent with the physical, social, psychological and economic background of the patient.
2. To provide temporary dietary supportive treatment, directed towards specific goals such as caries control, postoperative healing, or soft tissue conditioning.
3. To interpret factors peculiar to the denture age group of patients, which may relate to or complicate nutritional therapy.

#### Nutrition in denture wearers:

- **Prosthetic therapy** in completely edentulous patients restores both function and confidence.
- **Longevity and stability** of complete dentures depend on the health of the oral mucosa.
- **Mucosal health** is directly influenced by the patient's diet.

- **Edentulous individuals** often consume less protein, fibre, carbohydrates, and essential vitamins due to avoidance of certain foods (e.g., fresh fruits, raw vegetables).
- **Nutritional deficiencies** can lead to poor mucosal tolerance and ill-fitting dentures.
- **Understanding nutritional needs** and factors affecting food choices helps prosthodontists identify patients at risk of malnutrition.
- **Incorporating dietary guidance** into the treatment plan improves denture tolerance and reduces risk of rejection.
- **Dietary counselling** can be integrated during multiple denture fabrication appointments.

#### **Factors Affecting Nutrition [2-20]**

##### **Physiological factors:**

With a decline in lean body mass in the elderly, caloric needs decrease and risk of falling increases. Vitamin D deficiency in turn, is a major cause of metabolic bone disease in the elderly. Declines in gastric acidity often occur with age and can cause malabsorption of food-bound vitamin B12. Many nutrient deficiencies common in the elderly, including zinc and vitamin B6, seem to result in decreased or modified immune responses. Dehydration, caused by declines in kidney function and total body water metabolism, is a major concern in the older population. Overt deficiency of several vitamins is associated with neurological and/or behavioural impairment B1 (thiamine), B2 (niacin), B6 [pyridoxine], B12, foliate, pantothenic acid, vitamin C and vitamin.

##### **Psychosocial factors:**

A host of life-situational factors increase nutritional risk in elders. Elders, particularly at risk, include those living alone, the physically handicapped with insufficient care, the isolated, those with chronic disease and/or restrictive diets, reduced economic status and the oldest old.

##### **Functional factors:**

Functional disabilities such as arthritis, stroke, vision, or hearing impairment, can affect nutritional deficiency indirectly

##### **Pharmacological factors:**

Elderly individuals often rely on multiple daily medications, which can lead to side effects like nausea, vomiting, anorexia, gastrointestinal issues, xerostomia, and loss of taste. These effects contribute to poor appetite, nutritional deficiencies, weight loss, and ultimately, malnutrition.

##### **Oral factors that affect diet and nutritional status:**

**Xerostomia** affects almost one in five older adults. Xerostomia is associated with difficulties in chewing and swallowing, all of which can adversely affect food selection and contribute to poor nutritional status. The use of drugs with hypo salivary side effects may have deleterious influence on denture bearing tissues.

**Age-related changes in taste and smell** may alter food choice and decrease diet quality in some people. Factors contributing to this reported decreased function may include health disorders, medications, oral hygiene, denture use and smoking.

**The presence of natural teeth and well-fitting dentures** were associated with higher and more varied nutrition intakes and greater dietary quality, in the oldest old Iowans sampled.

**Effects of dentures on chewing ability** as adult's age, they tend to use more strokes and chew longer, to prepare food for swallowing. Masticatory efficiency in complete denture wearers is approximately 80% lower than in people with intact natural dentition.

##### **Denture's effect on food choices, diet quality and general health**

- The existing status of dentition and masticatory function affect variedly on intake of nutrition [6].
- Elderly compensate the decreased masticatory efficiency by selecting either processed or cooked foods. These people are used to chew it for longer time before making it palatable for swallowing.
- Some people may eliminate entire food groups from their diets due to reduced masticatory ability [7]. Dentate people tend to eat more fruits and vegetables than complete denture wearers.
- Replacing poorly fit dentures with new prosthesis may not improve dietary intake drastically [6].
- Also, replacing conventional ones with implant-supported dentures has not proved a significant improvement in food selection or nutrient intake [7]. Nutrient needs of the elderly [8-14] Several researches

agree that many of the degenerative changes observed in the oral cavity may be due to lack of essential nutrition

### **Energy**

- Ageing causes decline in basal metabolism and physical activity thus reducing energy requirements necessary for body.
- In elderly men, the average energy consumption is 1800 kcal whereas in women it is about 1300 Kcal

Energy deficit leads to dull and dry hair, enlarged parotid gland, muscle wasting, pallor, pale tongue and conjunctiva and spoon-shaped nails.

### **Calories**

- Ageing causes decreased calorie requirements due to reduced energy expenditures and a decline in basal metabolic rate [10].
- In elderly men, the mean RDA is 1600 Kcal, whereas in elderly women it is 2400 Kcal.

### **Protein**

- Ageing leads to increased demand of protein requirement [13].
- Protein depletion in elderly seen as a decrease of the skeletal muscle mass. Deficiency of proteins causes edema and hence proteins are a must for denture wearers [12].
- RDA is 0.8 g/kg body weight per day (for persons above 51 years old)
- Dairy products, poultry. Meats, fish, nuts, grains, legumes and vegetables are the best sources of proteins

### **Carbohydrates**

- On daily basis, elderly consume more of carbohydrates because of their low cost compared to sources of protein. Carbohydrates containing sources can be stored without refrigeration and more preferred because of their ease of preparation
- Approximately, intake of 50 to 60% of total calories belongs from carbohydrates.
- Grains, cereals, vegetables, fruits and dairy products are the good sources of carbohydrates

### **Fiber**

- Fibre is an important component of complex carbohydrates. Fibre-rich diet promotes bowel function and helps in reducing serum cholesterol. It also, prevents diverticular disease.
- Out of two forms, bran fibre is frequently added to dry cereals and breads. The other form i.e. vegetable fibre is more effective and less expensive [14].
- Often, edentulous elderly provoke gastrointestinal disturbances due to less consumption of fibre-rich foods. Decreased masticatory efficiency could be a reason for reduced selection of foods rich in fibre that are hard to chew [15].
- Joshipura., et al. [16] reported that even 1 gm of difference in dietary fibre intake between the dentate and completely edentate individuals can raise 2% risk for myocardial infarction.

### **Water**

- Excessive water loss due to damaged kidney provokes negative water balance among elderly [17].
- Insufficient water intake in elderly causes dehydration, hypotension, and elevated body temperature, dryness of mucosa, decreased urine output and mental confusion.
- Minimum fluid intake should be 30 ml/kg body weight per day among elderly.

### **Vitamin A**

- RDA is 800-1000 µgm.
- Animal foods such as liver and milk and milk products are rich sources of retinal/active Vitamin A.
- Deep green and yellow fruits and vegetables (apricots, carrots, and spinach) are good sources of beta-carotene/ pro-vitamin A.
- Vitamin A deficiency results in Bitot's spots, xerosis of cornea, conjunctiva, oral mucosa and skin, follicular hyperkeratosis decreased salivary flow and decreased taste acuity.
- If the deficiency persists, it leads to hyperplasia of the gums or generalized gingivitis.

### **Vitamin B complex**

#### **Thiamine**

- Thiamine deficiency has been reported among the poor, institutionalized and alcoholic elderly people. Thiamine deficiency, most commonly, develops beriberi.
- For elderly, the RDA of 0.5 per 1000 calories or 1 mg daily is advised.

- Pork or chicken-based meats, peas, whole grains, fortified grains, cereals and yeast are the best sources of thiamine.

#### **Vitamin B6 deficiency (pyridoxine)**

- Approximately, 50 to 90% of the elderly are affected by vitamin B6 deficiency. This is an important cause of the increased prevalence of the carpal-tunnel syndrome in the elderly.
- The RDA is 1.2-1.4 mg.
- Vitamin B6 deficiency results in nasolabial seborrhoea and glossitis.

#### **Vitamin B12 (riboflavin)**

- Kidney, heart, milk, eggs, liver and green leafy vegetables are rich sources of vitamin B12.
- In elderly, the RDA of vitamin B12 is 3 µgm.
- Vitamin B12 deficiency leads to nasolabial seborrhoea, fissuring/redness of eyelid corners and mouth. It also causes magenta coloured tongue and genital dermatosis

#### **Vitamin C**

- The RDA is about 60 micrograms.
- Citrus fruits, tomatoes, potatoes and leafy vegetables are the best sources of vitamin C
- Vitamin C deficiency leads to spongy and bleeding gums, petechia, delayed healing and painful joints [13].

#### **Vitamin D**

- Most of the elderly develop vitamin D deficiency due to lack of sun exposure and an inability to synthesize vitamin D in skin and convert it in kidney.
- Fish liver oils is the rich source of vitamin D.
- The RDA is 5 micrograms.
- Vitamin D deficiency develops bow-legs and beading of ribs.

#### **Vitamin E**

- As total plasma vitamin E levels increases with the advancement of age, its deficiency does not create a problem.
- The RDA is 8-10 mg alpha-TE. Minerals Deficiencies of minerals (magnesium, fluoride, folic acid, zinc and calcium) have been reported in the geriatric people with varied dentition [18]. Folic acid
- Folate deficiency has been developed among economically deprived urban blacks and institutionalized elderly. These groups have found to be at greater risk of developing folate deficiency.
- RDA is 500 micrograms.
- Leafy green vegetables, oranges, liver, legumes and yeast are one of the best sources of folic acid.
- Folic acid deficiency leads to megaloblastic anaemia, ulcers in oral cavity, glossodynia, glossitis and stomatitis.

#### **Calcium**

- RDA is 800mg/day.
- Due to lack of HCL acid in the stomach, elderly develop a decline in calcium absorption. Hence, elderly should be cautious in acidulating the calcium before its digestion.
- Common finding among elderly is lactose intolerance due to lactase deficiency. Therefore, milk must be advised to be consumed in the modified form [19].
- Milk and its products, dried beans, peas, canned Salmon, leafy green vegetables and tofus are the best sources of calcium.

Denture wearing elderly often shows rapid and excessive residual ridge resorption that can be a result of negative calcium balance. This further may contribute in developing osteoporosis [13].

#### **Iron**

- The prevalence of iron deficiency is rare among the healthy elderly. Blood loss can be suspected in elderly affected with anemia.
- RDA for iron is 10 mg. Meat, fish, poultry, whole grains, leafy green vegetables, dried beans and peas are good sources of iron.
- Deficiency of iron may lead to burning tongue, dry mouth, anemia and angular cheilosis [11].

#### **Zinc**

- Age-related decrease (mostly after an age of 65 years) in intestinal absorption declines the utilization of zinc.
- RDA is 15 mg.
- Animal products, whole grains and dried beans are the good sources of zinc.

- Zinc deficiency leads to decrease in taste acuity, mental lethargy and slow wound healing.

#### **Diet Recommended for a New Denture Wearer**

The regularly followed procedure of eating food is ingestion, mastication, and swallowing/deglutition. For a new denture wearer, it is much easier to just swallow the food. As the patient tends to swallow food in their first days' postinsertion, it becomes mandatory to put the patient on a proper liquid diet until they get accustomed to the new prosthesis. Once the oral cavity of the patient shows significant improvement without any allergic reactions toward the given prosthesis, a solid and firm diet can be followed.

**Table 1:** Nutrient needs of elderly individuals<sup>11-16</sup>

<i>Vitamin</i>	<i>Recommended daily allowance</i>	<i>Deficiency manifestations</i>
Vitamin A	800–1000 µg/day	Dryness and keratosis of oral mucosa Decreased salivary flow Hyperplasia of gums
Thiamine (vitamin B <sub>1</sub> )	1 mg/day	Beri-beri
Vitamin B <sub>6</sub>	1.2–1.4 mg/day	Severe glossitis
Vitamin B <sub>12</sub>	8 mg/day	Magenta-colored tongue Glossodynia
Vitamin D	5 µg/day	–
Vitamin E	Total plasma levels increase with age	Deficiency is rare
Vitamin C	60 µg/day	Spongy bleeding gums
Folic acid	500 µg/day	Mouth ulcers Glossodynia Stomatitis and glossitis

**Table 2:** Recommended daily allowance (RDA) of minerals

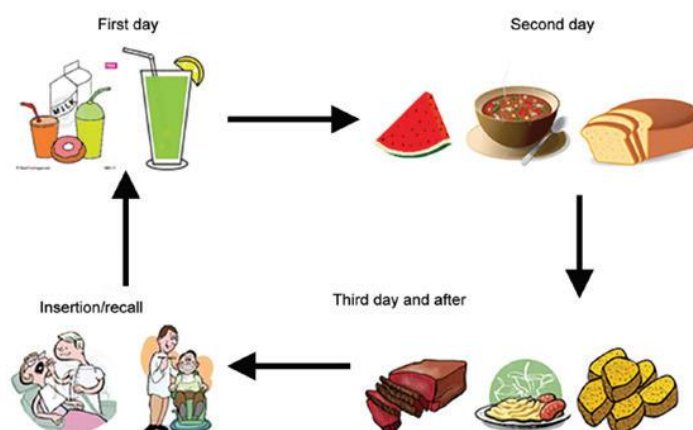
	RDA	Deficiency manifestations
<i>Mineral</i>		
Calcium	800 mg/day	Alveolar ridge resorption Osteoporosis
Iron	10 mg/day	Burning tongue Anemia
Zinc	15 mg/day	Angular cheilitis Decreased taste sensation Delayed wound healing
<i>Component</i>		
Energy	65- to 74-year-old female: 1300 kcal/day	Parotid gland enlargement
	65- to 74-year-old male: 1800 kcal/day	Muscle wasting Pale and atrophic tongue
Protein	56 gm/day male 46 gm/day female	edema
Carbohydrates	50–60% of total calories consumed per day	Deficiency is rarely seen
Water	30 mL/kg body wt/day	Xerostomia
Calories	1600 kcal/day female 2400 kcal/day male	Decreased masticatory ability

### First Postinsertion Day

**Vegetable-Fruit group:** Fruit or vegetable juices are advised. In addition to providing necessary nutrients, juices also produce a soothing effect in the oral cavity of the patient. **Bread-Cereal group:** Softened bread or cereals mixed in liquid consistency can be recommended to maintain protein levels of the body. **Milk group:** Fluid milk is included in the dietary pattern which serves as rich source of calcium and prevents conditions like osteoporosis. **Meat group:** Meats made into puree form, meat broths or soups which are more palatable and easier to swallow can be instructed. As the geriatric age group is more prone to physiologic muscle loss and bone resorption, two glasses of milk have to be added to the dietary menu to prevent osteoporosis.

### Second and Third Postinsertion Day

**Vegetable-Fruit group:** Juices; seedless and peeled vegetables, fruits cooked in semi-solid consistency. **Bread-cereal group:** Cooked cereals, rice porridge, soft noodles or pasta, crushed bread powder with milk. **Milk group:** Milk and melted cottage cheese can be directly consumed. **Meat group:** Tenderly cooked chicken, finely cut beef, thick broth or soups, fish liver with thick cream, etc. The sample menu must include consumption of any two dairy products (milk, butter, cheese, etc.) at least once a day



**Fig. 2:** Dietary habits for a new denture wearer

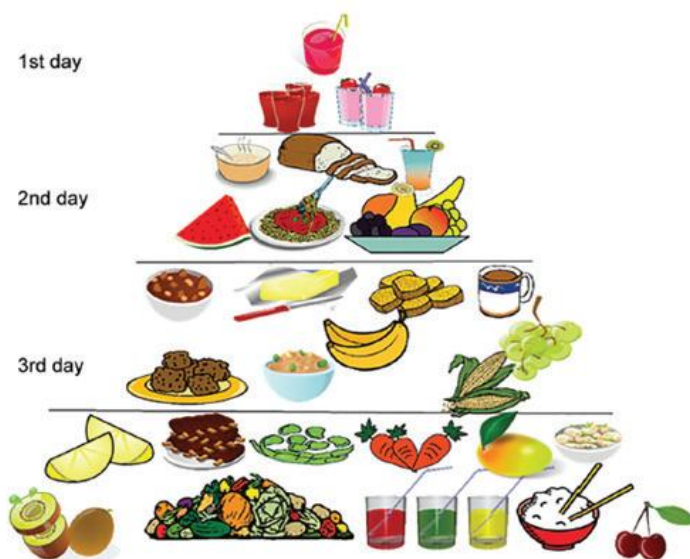


Fig. 1: Food pyramid for geriatric denture wearers

#### Fourth Day and After

With the usage of dentures together with denture hygiene, the sore spots which were once painful and red creating inconvenience to the patient tend to heal. The patient can shift the dietary needs from soft fluid diet to a solid diet. Care must be taken to prevent gagging or choking. This is done by cutting the food into smaller bits before consumption until the patient gets adapted with the prosthesis (Figs 1 and 2).

#### Recommendations

Recommendations can be given to health care providers to highlight about the nutritional status of elderly individual while taking case history. Together with past medical history, nutritional assessment could be made mandatory in the form of mini nutritional assessment tool. The assessment should include intentional/unintentional weight loss/gain, changes in dietary pattern, and type of food eaten and difficulty in eating. Health care professionals should be consistent in providing necessary dietary care or recommendations could be made to a nutritionist. Recall visits should be made mandatory for adults with full dentures for their scheduled oral health assessments. Difficulties in chewing and denture discomfort are common with old age. This could further decrease or alter the dietary pattern due to pain and discomfort. Denture alterations are necessary to prevent mucosal abrasions and edema.

## II. Conclusion:

Complete denture wearers are at a higher risk of malnutrition compared to the general population, making regular monitoring of their nutritional status essential to prevent complications. Nutritional deficiencies not only affect overall health but also contribute significantly to prosthesis failure. Therefore, dietary counselling and nutritional analysis should be an integral part of the denture fabrication process. Dentists must educate patients on the risks of imbalanced diets and excessive intake of cariogenic foods, offering tailored dietary advice to support oral and systemic health. As the elderly population becomes more informed and less accepting of traditional extraction-based treatments, functionally oriented and minimally invasive strategies should be prioritized. Ultimately, a multidisciplinary, patient-centred approach is crucial for achieving long-term success in prosthodontic care for the elderly.

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