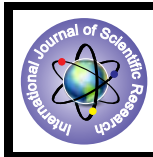


# Nutrition and Metabolism in Geriatric Oral Health



## Medical Science

**KEYWORDS :** Nutrition, Geriatrics, Metabolism, Vitamins and minerals

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### ABSTRACT

*Geriatric dentistry is the branch of dentistry that emphasizes dental care for the aged persons and focuses upon patients with chronic physiological, physical and/or psychological changes or morbid conditions/ diseases. Assessment of nutritional status of the geriatric patients is an essential part of pre prosthetic treatment considerations. This article discusses the age related changes in the oral tissues, nutrition and metabolism in the elderly, signs and symptoms of nutritional deficiencies as well as the daily nutritional requirements of a geriatric patient which are helpful in formulating dental treatment plans.*

### INTRODUCTION

With increasing longevity the proportion and number of persons in the age group of 65 years and beyond is increasing, women outnumbering men in this age group. The population of elderly is expected to reach 11 crore by 2016 which was 6 crore 20 years ago. With increasing age, there are metabolic changes and also reduction in physical activity and as a result energy requirement in the elderly is substantially lower than younger adults. The dietary intake of essential dietary nutrients is less than the required dietary intake in both the sexes. In addition, elderly individuals also face problems in ensuring appropriate dietary intake because loss of teeth and alteration of taste perception with increasing age. As people age, multiple changes occur that affect the nutritional status of an individual. A decrease in saliva production xerostomia and changes in dentition alter the ability to chew and may lead to changes in food choices. The dental management of the elderly population is different from that of the general population because special considerations for age-related physiological changes, nutritional and metabolic changes, increased incidence of physical/mental disabilities, and social concerns are required. Therefore, special knowledge, attitudes, and skills are necessary to provide prosthetic care to the elderly.

(periodontium) but also include salivary glands, TMJ joint, orofacial muscles, oropharyngeal mucosa, and oral sensory/motor nerve systems.

Bone is a conspicuously labile tissue, resorption and deposition occur synchronously in the process of growth and remodeling, an essential phenomenon for balance between structure and function. Once growth is complete, bone is notably less labile, although homeostatic regulation necessitates some degree of continuing resorption and deposition. Alveolar bone has the highest rate of renewal and is affected first and consequently is the most severely affected in the long term. By the time old age is reached, atrophy has resulted from slow, uncompensated resorption<sup>5,6</sup>. Severe resorption of alveolar bone causes mobility of teeth and difficulty in mastication of non starch polysaccharides. Increasing fragility of elderly bone is not merely a consequence of atrophy. Bone composition gradually alters, resulting in reduced resilience and increased brittleness. It is estimated that the mineral content is reduced by 50% in women and 40% in men by age 75. Microscopically, the cellular component diminishes progressively as age advances so that the bone appears to be sclerotic and surviving osteocytes appear to be shrunken. Above all, however, the quantity of mineralized tissue is conspicuously reduced both in cortical and trabecular bone.

Oral mucosa possesses no singular feature related to the effects of aging. The oral mucosa shows a less obvious slow atrophy and loss mostly reflective of a gradual deterioration in bodily efficiency. Elderly patients suffer a loss of tissue and oral fluids associated with reduced vascularity and salivary secretion. This depletion is attributable to an age-related decrease in acinar tissue, compared with ductal and connective tissues<sup>7,8</sup>, resulting in increasing vulnerability to minor injury. Wound healing becomes progressively less rapid with advancing age because of decreased vascularity and locally impaired hemodynamics, which arise from damage to and thickening of vessel walls. Decreased immune response introduces yet another obstacle to healing, and, perhaps most importantly, the capacity of cells to undergo division can decline until the proliferative response essential for repair is deficient<sup>5,6</sup>.

Finally, there are age-related changes in the masticatory musculature and TMJ. With age, muscle fibers decrease in size and number and are replaced by fat and fibrous connective tissue. 30-40% of patients greater than 70 years old exhibit TMJ dysfunction, tenderness of the masticatory muscles, and abnormal joint sounds<sup>9,10</sup>.

### NUTRITION AND METABOLISM IN GERIATRIC PATIENTS

Nutrition is the intake of food, considered in relation to the body's dietary needs. Ideal diet is one which is nutritious, easily available and easily digestible. A proper dietary history, clinical examination, and laboratory testing helps to assess the nutritional status of the geriatric patient. It has been estimated that 20% of population above 80 years of age suffers from malnutrition. The major factors influencing nutritional status are (1)

### FACTORS INFLUENCING NUTRITION IN GERIATRIC PATIENTS

1. Age related changes in the oral tissues	Periodontal disease ,tooth loss e.t.c
2. Psychological factors	Isolated geriatric patients, chronic diseases, shortage of money
3. Pharmacological factors	Many drugs cause anorexia, nausea,vomiting, xerostomia,and dysguesia
4. Functional factors	Disabilities like arthritis ,visual impairment e.t.c
5. Physiological factors	Metabolic changes due to aging

### AGE RELATED CHANGES IN THE ORAL TISSUES

Dental health status may influence nutrition. Intake of non-starch polysaccharides, protein, calcium, non-heme iron, niacin, and vitamins are significantly lower in edentate subjects. One of the most likely mechanisms by which impaired oral health may affect diet is that difficulty chewing causes dietary restrictions. Often there is no clear demarcation between normal physiological aging and pathological diseases. Losses of tooth translucency and surface details are common changes during aging. Abrasion, attrition, and erosion of teeth usually increase with advancing age<sup>1</sup>. The dental pulp becomes smaller because of secondary dentin and pulp stone formation, and sometimes root canals become totally sclerosed<sup>2,3</sup>. Losses of tooth support structures (periodontium) are also commonly seen in elderly patients<sup>3,4</sup> which may ultimately result in tooth loss. As gingival recession increases, resulting in exposure of root surfaces to the oral environment, the prevalence of root surface caries increases in the dentate elderly population. It should be noted that oral tissues are not limited to the teeth and supporting structures

intake of nutrients (2) absorption of nutrients, (3) nutrient losses, and (4) nutrient metabolism. Out of these 4 nutritional determinants, the 3 determinants i.e intake of nutrient, absorption of nutrients, and nutrient metabolism are profoundly affected by ageing .

#### **NUTRIENT INTAKE IN THE ELDERLY**

Food intake relates to a number of factors. Factors which affect nutrient intake in the elderly is multifactorial such as social isolation, depression, bereavement, limited mobility, and visual impairment . Diminished activity reduces the need for food intake. Medications with anorectic drugs, lack of interest in food (senses of taste and smell decline with age) can contribute to a dietary deficiency. Adherence to special diets, intake of alcohol, tobacco and drug use can contribute to deficiency states as can a financial hardship. Dysphagia, dysphagia and poor dental health also affect the intake of proper nutrition.

#### **NUTRIENTS ABSORPTION AND GASTRO INTESTINAL FUNCTION IN AGING**

Gastrointestinal changes in ageing includes higher prevalence of atrophic gastritis, oesophageal dysmotility, and lactose intolerance. Atrophic gastritis leads to decreased availability and absorption of food bound vit B12, calcium carbonate and non haem iron. Malabsorption of fats and fat-soluble vitamins (A, D, E, and K) is associated with a variety of conditions in the elderly such as gastritis, coeliac disease, and diverticulosis.

#### **NUTRIENT LOSSES**

Nutritional losses are the determinants of nutrition not related to ageing process. Disorders of the GI tract may give rise to nutritional deficiencies through loss of nutrients. Loss of iron as a result of bleeding (ulcers, hemorrhoids, and aspirinlike drugs used to treat arthritis cause GI bleeding) is the most common cause of iron deficiency in the elderly.

#### **NUTRITION AND METABOLISM IN AGING**

Ageing is associated with many changes in the nutrient metabolism and requirements. Altered vit D metabolism in aging and chronic renal disease results in increased calcium needs. Vitamin D deficiency is common in patients not exposed to significant amounts of natural sunlight. Adequate vitamin D is absolutely essential for absorption and metabolism of calcium. The consequence of vit D deficiency includes osteomalacia, decreased calcium absorption and increased fracture risk. Decreased calcium absorption may lead to a low bone mineral density that may adversely affect bone health. Calcium also plays an important role in muscle contraction, blood coagulation, neurotransmitter secretion and digestion.

Vit A metabolism may decrease with ageing and protein metabolism may change with aging. More than 80% of people older than 60 years are taking at least one medication. The medication taken by the patient to be absorbed ,transported , metabolized and eliminated. Therefore drug metabolism is of particular concern in aging patients. Nutritional deficiencies may lower plasma protein levels, thus affecting protein binding of drugs. Binding sites on plasma protein molecules, especially albumin, are reduced with age. Thus more free drug will be available (particularly in the case of those drugs that are highly protein bound).The possibility of adverse interactions between protein bound drugs is very real.

#### **SIGNS AND SYMPTOMS OF NUTRITIONAL DEFICIENCIES**

Nutritional deficiencies may give rise to a variety of clinical signs and symptoms that can be diagnosed during the clinical examination. The presence of angular cheilosis/chelitis, glossitis, dermatitis, diarrhea, and memory' loss indicate B-complex deficiencies. Lack of vit C results in delayed wound healing while a generalized pattern of bone decalcification and muscular weakness may be related to lack of vitamin D. Deficiencies of calcium, potassium and magnesium, may give rise to cardiac disturbances, muscle tremor, tetany, and postural hypotension. Atrophic buccal mucosa, anemia and reduced resistance to infection may indicate depressed levels of iron, zinc, and copper. Vit K deficiency leads to bleeding problems and impaired night

vision may be indicative of vitamin A deficiency. The clinical diagnosis of nutritional deficiencies should be accompanied by biochemical and hematologic testing and arrangements should be made with the patient's physician for evaluation and testing whenever a nutritional deficiency is suspected.

#### **NUTRITIONAL REQUIREMENTS OF THE ELDERLY**

##### **Protein requirements**

Proteins are the building blocks of the body constituting 30% of total caloric requirement. Geriatric patient's diet should be rich in proteins since they all cannot be synthesized by human body. Due to reduced appetite and poor digestion the elderly patients eat less proteins and more carbohydrates ,which leads to increase in their weight To meet the protein requirement they need food more rich in proteins like pulses, meat ,eggs, milk and dairy foods. The ideal requirement is 1 gm per kg body weight.

##### **Carbohydrates**

Carbohydrates supply body with energy and should be 60% of the total requirement of calories. Geriatric patients using complete dentures are prone to eat more soft food and hence they consume more carbohydrates. The geriatric patients should be educated that calories alone cannot adequately supply their energy needs. They must have carbohydrates in combination with other needs, such as proteins, vitamins, minerals, fats, etc.

##### **Fats**

Fats should be 10% of total caloric requirement. Fats promote absorption of the fat-soluble vitamins A, D, E, and K. In fact omega-3 polyunsaturated fatty acids, a polyunsaturated fat from fish, help prevent heart disease by lowering blood cholesterol levels.

##### **Vitamins and minerals**

Vitamin C requirements for geriatric people are the same as younger adults and it helps in maintaining healthy tissue, and wound healing . Vit C is also a good antioxidant . The rich source of vit C are fruits and vegetables. For geriatric patients with Vit C deficiency supplementary diet is very essential. Vit D is required for absorption of Ca from food and hence important for alveolar bones and teeth. Vitamin D deficiency is common in patients not exposed to significant amounts of natural sunlight. Geriatric patients who are housebound, should take Vit D supplement. Recommended vitamin D supplement is 10µg/day). Dietary sources rich in vitamin D includes fish, eggs and cereals. Requirements for folate, vitamin B12 and other B vitamins such as thiamin and riboflavin are the same as the younger adults. Thiamin, riboflavin, niacin, vitamin B6, pantothenic acid, and biotin are necessary for energy metabolism at rest and during physical activity; folate and B12 vit are essential for R.B.C production tissue repair and protein synthesis. Vit B complex has enhancing effects on energy metabolism ,cell regeneration and cognitive function. However maintaining good intakes is important to prevent deficiency. Unfortunately geriatric patients are found deficient in Vit B 12, and other B vitamins mainly because poor dietary intake. Vitamin B12 slows aging and prevents weak bones (osteoporosis). The typical general supplemental dose of vitamin B12 is 1-25 mcg per day. Required dose of folic acid is 500 micrograms. Deficiency causes mouth ulcers, glossodynaia, and stomatitis.

##### **Calcium**

Geriatric patients must take enough Ca in since it helps in reducing alveolar bone wearing. Milk and dairy products that are rich in dietary calcium should be consumed. Geriatric patients not consuming sufficient milk and dairy products should be given Ca supplements. Recommended intake of calcium per day = 700mg in adults over 50 years old.

##### **Iron**

Formation of RBCs and oxygen transport to tissues requires adequate intake of iron . Iron deficiency anemia results due to decreased intake as well as absorption of iron from the gut. Vit C rich food may help absorption of Iron. Anaemic elderly patients may need supplementary iron dose of 10 mgms /day.

**Zinc**

Required dose 15 mgs. Deficiency of zinc is due to poor absorption from intestines, common in geriatric patients above 65 years. Deficiency causes change in the taste, mental lethargy.

**CONCLUSION**

In the diagnosis and treatment planning for geriatric patients consideration should be given to nutritional deficiencies and metabolic imbalances. Of the many systemic factors which in-

fluence the treatment responses of patients, nutritional factors may be subject to the dentist's control just as are factors of dental treatment. Dentists should take the responsibility of correcting nutritional problems of their patients, either by themselves or by referral to qualified therapists. These patients need all the encouragement they can receive to make the best of their remaining years.

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