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REVIEW ARTICLE

Role of Nutrient Intake in Geriatric Patients

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ABSTRACT:

Nutrition is a broad term which includes ingestion, digestion, absorption and transportation of essential food elements. The human body changes with advancing age that can affect or can be affected by nutrition. With the progression of age, impairment in dentition status affect total calorie intake and hence affects nutritional requirements. The balanced diet comprises of proteins, carbohydrates, fibre, water and numerous vitamins and minerals, importance of which has been discussed in the article. There are certain aging factors and oral factors which affect diet and nutrient intake. The adequate diet recommended for older adults have been discussed and a fivefold treatment plan pertaining to oral tissues conditioning is reviewed in the article.

Key words: Nutrient, Diet Geriatric.

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INTRODUCTION

The notion that "life begins at forty" is a 20th century one. But there are certain disorders that occur far earlier than their signs and symptoms are clinically evident^[1]. There are changes that occur with aging that can affect or can be affected by nutrition^[2]. Nutrition is more than just a diet. It includes ingestion of adequate and balanced diet and digestion, absorption and transportation of essential food elements to the tissues and utilization of these elements by the body cells^[1]. The lifetime dietary habits of a person lays down a foundation and may cause dietary imbalance and deficiency states^[3]. The elderly are not just the 'old people' ; they are structurally , mentally and functionally different from the days of their youth and early maturity^[1]. As the functioning of the elderly tend to slow down, the caloric requirements for the maintenance of general body processes continually

decrease^[1]. According to numerous studies , the average caloric requirements are 10 percent less when we have reached the age of 60, 20 percent less at the age of 70 and significantly 25 percent less by the age of 90^[1]. This is primarily due to a reduced muscular activity and a slower basal metabolic rate as we grow. Therefore the elder patients should be advised to include food in their diet especially of high caloric value^[1]. A decrease in quantity and quality of food will lead to decrease in energy and lack of nutrients which subsequently will lead to malnutrition , associated with lowering in functional skills, more susceptibility to infection, increased morbidity and higher mortality^[4]. As the age advances, the progressive impairment in dentition status curtail the calorie intake, amount of proteins, carbohydrates, fiber and numerous vitamins and minerals^[5]. Limited food choices among the edentulous or partially edentulous states affects

nutritional status^[4]. For example, there are several studies which shows that intake and serum levels of folate, vitamin A and C are significantly lower in edentulous patients than those who has natural teeth or atleast restored with prosthesis^[4]. This article discusses the factors which affect the nutritional status that may occur with aging, reviews nutrition with its oral implications and provides various strategies for overcoming nutritional problems.

AGING FACTORS THAT AFFECT NUTRITIONAL STATUS^[2,6]

Physiologic factors

- With a decline in lean body mass in the elderly (sarcopenia), caloric needs decrease and risk of falling increases
- Decline in gastric acidity (hypochlorhyria) and atrophic gastritis with age can cause malabsorption of food bound vitamin B12
- Many nutritional deficiencies including zinc, vitamin B6, often decrease the immune response in the elderly.
- There is decrease in intestinal functioning which leads to lower absorption of nutrients in the aged people
- Overt deficiency of multiple vitamins is associated with cognitive and neurological impairment
- Lactase deficiency due to decrease in enzymes can cause deficiency of calcium due to indigestion of dairy products.

Psychosocial factors

- A host of life situational factors increase nutritional risk in elders
- Isolated elderly, due to loss of spouse, with chronic disease, physically handicapped , patients with restrictive diets, those with low economic status and homebound elders are at major risk for nutritional deficiency
- Patients with mental illness are associated with anorexia, weight loss and increased morbidity in the old

Functional factors

- Disability like arthritis, improper gait or stroke affect nutritional status indirectly
- Handicap like visual or hearing impairment may lead to social isolation, poor eating habits and subsequent malnutrition

Pharmacological factors

- Most elders take several prescription and over-the counter medications daily.

- Depletion of physiologic function can affect absorption and bioavailability of the drugs.
- Consumption of alcohol causes an increase in calories but has no nutritional value and it also causes decrease in appetite in persons

ORAL FACTORS THAT AFFECT DIET AND NUTRIENT INTAKE^[2]

Xerostomia

- 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 salivation side effects may have deleterious influence on denture bearing tissues.

Gustatory and olfactory function

- Age-related changes in taste and smell may alter food choice and decrease diet quality in some people. Factors contributing to decrease this function may include health disorders, medications, oral hygiene, denture use and smoking.
- Sensory changes may diminish the appeal of some foods (e.g., sensitivity to the bitterness of cruciferous vegetables), limiting their consumption and potential health benefits function.

Oral infectious conditions

- Age related bone loss that may occur due to nutritional deficiencies can result in increased risk of tooth loss and edentulous states
- Periodontal disease also increases with age and may be exacerbated by nutritional deficiencies.

Dentate status

- Dentate status can affect diet, nutrition status which in turn affects the general health.
- Reduced masticatory ability is related to an overall reduction in functional capacity and general health

EFFECT OF EDENTULOUSNESS ON DIET AND NUTRIENT INTAKE

Dentition status and nutrition intake are significantly linked to masticatory function^[5] Several studies indicates that the loss of natural teeth causes reduced masticatory efficacy even after replacement with denture^[7]. In a study by Joshipura et al, edentulous patients are found to consume less dietary and crude

fiber, carotene, vegetable, fresh apples or pears and carrots and consumed more processed food with more saturated fat and cholesterol [7]

Effect of dentures on food choices, diet quality and general health

With the progressive impairment of dentition in people with increase in age, diet quality seems to decrease [2]. When the dentate status causes change in food habits, the nutritional status also suffers. In one study of older adults the number of oral problems (including limited chewing ability) were most important predictor of weight loss [2]. With poor oral health condition, compromised dentition, people with increasing age are left with a few limited food choices causing overall decrease in diet quality which impacts general health of the elderly [4].

NUTRITIONAL OBJECTIVES [3]

The primary nutritional objectives are

- (1) To establish a balanced diet which is consistent with the physical, social, psychologic, and economic background of the patient
- (2) To provide temporary dietary supportive treatment directed toward 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

IMPORTANCE OF PROTEINS [1]

If we omit the water content of the body, a person of average build is almost entirely made up of proteins. Only 4 per cent of the body consists of inorganic materials, which is chiefly calcium. Proteins can be built only from protein fragments, the amino acids. Blood cells are chiefly protein, and plasma is a protein suspension. Among the activators, most enzymes are protein, as are many of the essential vitamins such as thiamine, riboflavin, niacin, and para-aminobenzoic acid. The hormones, insulin, thyroglobin, and all of the recognized hormones of the anterior pituitary gland are proteins. Protein deficiency will lead to lower antibody production, reduced capacity of utilization of ingested calcium. Hypoproteinosis is considered to be etiologic in calcium absorption [8].

IMPORTANCE OF VITAMINS [9]

Vitamins B and C are water soluble vitamins. Vitamins A, D, E, and K are fat soluble vitamins. The water soluble vitamins are characterized by minimal storage of dietary excesses and excretion in urine. Deficiency symptoms of water-soluble vitamins often develop rapidly; they must be supplied daily in the diet and generally do not have precursors. An excess intake of fat-soluble vitamins is stored in the body, not excreted.

Deficiencies are slow to develop, so they are not a daily necessity in the diet. They do have precursors.

Vitamin A

Large quantities are stored in the liver; it is difficult to find a true vitamin A deficiency. Deficiency results in keratosis, xerophthalmia, and growth failure. Vitamin A is necessary for maintaining the integrity of the mucous membranes and the epithelial structures.

Vitamin B complex

Vitamin B complex includes thiamine (B1), which is required for carbohydrate metabolism and in biologic oxidative reactions; riboflavin (B2), which affects the ectodermal tissues and is essential for metabolic oxidation processes; and pantothenic acid, which is involved in antibody production. Folic acid is necessary for the proper function of the hematopoietic and leukopoietic systems, and pyridoxine is necessary for the utilization of many amino acids.

Thiamine deficiency results in beriberi.

Riboflavin B2 deficiency results in cheilosis and angular stomatitis.

Niacin deficiency results in pellagra.

Vitamin B12 deficiency results in pernicious anemia, sore tongue, cheilosis, and cheilitis

Folic Acid deficiency results in glossitis, cheilitis, and cheilosis.

Deficiencies of thiamine and niacin produce the most definite behavioral disorders.

Vitamin C

Vitamin C is required for the formation of intercellular substances, the healing of wounds, maturation of red blood cells, utilization, iron, and maintenance of blood hemoglobin levels. Ascorbic acid exerts a beneficial effect on the absorption of calcium and iron. The production of bone, because it is connective tissue, is greatly affected by the level of ascorbic acid, which is needed for maintenance of cells (osteoblasts, odontoblasts). Deficiency results in scurvy, capillary fragility, and ecchymosis. The average heavy smoker is usually seriously deficient in vitamin C

Vitamin D

Vitamin D enhances the absorption of calcium and is necessary- for proper calcium-phosphorus metabolism. Deficiency results in rickets. Undoubtedly it is the most toxic of all the vitamins when ingested in excess of one's needs, causing hypercalcemia.

IMPORTANCE OF MINERALS [1,8]

Various studies have illustrated deficiencies in magnesium, fluoride, folic acid, zinc and calcium, in the geriatric population.

Folic acid

Economically deprived urban blacks and institutionalized elderly are at the most risk of foliate deficiency. Deficiency causes megaloblastic anemia, mouth ulcers, glossodynia, glossitis, stomatitis.

Calcium

Because calcium absorption is decreased in the elderly (lack of hydrochloric acid in the stomach), the calcium must be acidulated before digestion. Lactase deficiency resulting in lactose intolerance is also common in elderly persons. This is another reason for modifying the milk for elderly persons.

Elderly patients with complete dentures often experience a rapid and excessive ridge resorption which may be related to negative balance of calcium, which contributes to development of osteoporosis.

Iron

A recent review concluded that the prevalence of iron deficiency, is relatively rare among the healthy elderly. When anemia is found in an older person, blood loss should be suspected.

Deficiency causes burning tongue, dry mouth, anemias and angular cheilosis.

Zinc

Zinc utilization declines with advancing age, because intestinal absorption decreases after the age of 65 years. Deficiency causes decreased taste acuity, mental lethargy and slow wound healing.

DIET RECOMMENDED FOR OLDER ADULTS^[2]

One significant change from previous recommended dietary allowances is the recognition that the very old, that is, individuals aged 70 years and above, may have different needs than adults between 51 and 70 years old. A new food pyramid has been designed for people aged 70 years and above to reflect the unique needs of older people. Compared with the original Food Guide Pyramid, the modified food pyramid for elders stresses fewer servings of grain products and more servings of dairy, and emphasizes adequate water intake. Elders should be encouraged to have six to eight 8 oz glasses of fluid daily (not including caffeine containing beverages, which are diuretics). Supplements may also be necessary to supply adequate intakes of some nutrients that are consistently found at low intake levels in the elderly population.



TREATMENT PLAN^[3]

A fivefold plan of treatment that may be used in nutritionally oriented tissue conditioning consists of

- (1) examination by physician
- (2) use of physical tissue conditioning agents
- (3) dietary advice
- (4) motivation
- (5) dietary supplementation

Medical examination

An examination by the patient's physician is advisable and is always indicated if an extensive dietary change is anticipated or if frank systemic or nutritional disease is apparent. Such an examination may benefit the dentist in two ways: (1) It may reveal concurrent medical problems which interfere with dental and general health or utilization of nutrients. (2) It may reveal specific medical problems such as diabetes or anemia which may be masked by any dietary treatment other than massive, concerted nutritional therapy.

Physical tissue-conditioning agents

The use of soft liners is an effective method for recovery of the tissues for optimum health. If monilial infection is present, massage of the oral tissues, including the tongue, with an antifungal agent and lavage and massage with a mouth wash that has antifungal properties are helpful for optimum healing.

Dietary advice and motivation

Advice and motivation must be considered concurrently since one reinforces the other. Because we are primarily concerned with the mouth, our discussion of nutrition should be oriented toward oral tissue preservation and healing, with emphasis being placed upon the abnormal stress imposed upon a denture foundation by appliances; the necessity of maintaining maximum tissue health; the relation of tissue health to nutrient supply; and the consequences of tissue abuse.

Nutritional education of the patient may be considered successful if the patient is made to realize that all

essential nutritional elements can be available in virtually any diet which observes basic rules of food distribution and quantity.

Dietary supplementation

Except in severe deficiency states, nutritional therapy does not produce sudden, dramatic changes in oral or general health. When conditioning of abused oral tissue is undertaken, temporary dietary supplementation should be considered. This supplementation may serve several purposes

- (1) create a sense of well-being and a feeling of immediate progress in the patient
- (2) stimulate appetite, thus making more acceptable any required dietary changes
- (3) provide a controllable and balanced source of required nutrients during the period of dietary transition
- (4) provide individual, specific nutritional elements.

ROLE OF THE PROSTHODONTIST

The prosthodontist is most concerned with general health and wellbeing of the older patients. Many debilitating diseases of old age and nutritional deficiencies impose a greater challenge to overall success of the prosthesis^[1] Maintenance of natural dentition and replacement of missing teeth with the prosthesis could help people to maintain a healthy diet and decrease the incidence and prevalence of diet related chronic diseases and nutritional deficiencies^[5]

SUMMARY

A well balanced diet of essential nutrients is vital to the general health of the patient. Nutrition is but one of the many factors which determines success or failure of prosthetic appliances in the mouths of aging people. A true specialist in any field, including prosthodontics, never loses the concept of total health of the patient. There can be no diet for dental health that is not a diet for total health.

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