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Nutritional Requirements in Geriatric Patients: A Systematic Review

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Abstract

To lead an active and healthy life, well nutrient intake is very important. Nutritional requirements differ in different physiological ages. Leading healthy life is particularly challenging in elderly population. There is nutrient deficiency majorly of protein in geriatric age group. Over 60% of elderly population is malnourished. This article reviews the basics of nutrition in elderly people and role of Prosthodontist in the same.

Keywords: Balanced diet, complete denture, geriatrics, nutritional requirements.

Introduction

To eat is a necessity, but to eat healthy is an art. Nutrition is an important element of health among elderly and it affects the whole process of ageing. Aging involves changes in physiological, psychological, social and pathological conditions of a person. Aging often results in malnutrition and is associated with decline in functional status, impaired muscle function, decreased bone mass, immune dysfunction, Anaemia, reduced cognitive function, poor wound healing, delayed recovery from surgery, higher hospital admission and mortality[1].

Due to changes in socioeconomic environment, elder people are often left alone to fund for themselves, to maintain their health which interferes with their good nutritional status[2].

General nutritional status in older adults

Malnutrition is common in elderly population throughout the world. Nutritional problems associated with aging process, from disease or medical problems, from

interactions with medications or all of the above. Most severe deficiency is protein energy malnutrition, it affects 2-4%percent of elderly population and is the major cause of mortality in them[3].

Changes in oral cavity with aging-

Bone: Increasing age is associated with progressive reduction in bone mass resulting in osteoporosis. Age-related osteoporosis is common and, in edentulous patients, may play a role in atrophy of alveolar and possibly basal bone. Atrophy of alveolar bone is related mainly to tooth loss. Its extent increases with age resulting, in the absence of dentures, in loss of facial height with upwards and forwards posturing of the mandible.

Oral Mucosa: In geriatric people the stratified squamous epithelium becomes thinner, loses elasticity, and atrophies with age. A declining immunological responsiveness further increases the susceptibility to infection and trauma. An increased incidence of oral and systemic disorders, along with increased use of medications, may lead to oral mucosal disorders in elderly persons. Elderly patients may develop vesiculobullous, desquamative, ulcerative, lichenoid and infectious lesions of the oral cavity.

Sensory changes: It is known that taste and smells sensitivities change throughout life and often decline with ageing. These changes can make foods become tasteless thus resulting in a reduction in appetite[4]. Such taste and smell dysfunctions may be due to a variety of contributing factors including oral diseases, systemic conditions and their associated treatments. Most studies suggest that the sense of smell is more impaired by ageing than the sense of taste. Olfactory cells which respond to smells are renewed much more slowly in elderly people. Olfactory acuity declines with age as the number of olfactory nuclei in the brain decline and the olfactory receptors in the roof of the nasal cavity regress. A diminution of taste results from the degeneration of taste buds and a reduction in their total number as renewal is much slower in elderly people. Elderly people have considerable differences in their sensory perception and capacity to detect the pleasantness of foods compared with younger people.

Aging factors that affect nutritional status

Physiological factors: decline in lean body mass, particularly muscle mass (sarcopenia) is often seen in adults[5]. Muscle mass in a predictor of strength, mobility, insulin sensitivity and basal metabolic rate. Thus, with decline in lean body mass, caloric needs decline. Decline in gastric acidity also increases with age. This results from atrophic gastritis and can cause malabsorption of food bound vitamin B12. Atrophic gastritis results from increased levels of bacteria in stomach and small intestine that bind vitamin B12 for their own use and make it unavailable. Vitamin B12 deficiency can cause neuropathy, megaloblastic Anaemia, gastrointestinal symptoms and cognitive impairment. Neurologic symptoms are found in 70 to 90% individuals with Vitamin B12 deficiency.

Vitamin D deficiency is common in elderly because of insufficient sun exposure, decline in skin's ability to metabolise vitamin D from sun and impaired liver and kidney function that activate Vitamin D. vitamin D deficiency is a major cause of metabolic bone disease. Impairment in function of intestinal track secondary to disease medication can also lead to maldigestion and malabsorption.

Classic example is increase in lactose deficiency. It can result when villi in small intestine secret too little lactase enzyme to fully digest the milk sugar lactose. The resulting pain, bloating, excess gas can lead people to avoid dairy products. The adoption of low fibre diet in response to chewing deficiency and/or dentures can exacerbate the constipation in elderly. Overuse of

laxatives may lead to malnutrition by causing nutrient malabsorption.

Immune responsiveness decreases in elderly. As a result, infection is leading cause of death in them. Many nutrient deficiencies common in elderly people including zinc and Vitamin B6.

Dehydration is also a major concern in older population. It is caused by decline in kidney function and total body water metabolism. It can be insidious and unrecognised until serious side effects occur. The thirst threshold may be impaired in elderly making thirst a poor indicator of hydration status.

Psychosocial factors: They may play important role in physical, medical and dental issues in determining health. Elders particularly those living alone, physically handicapped, those with chronic diseases, with restrictive diets and the oldest once are at greater risk. Poverty also contributes in malnutrition. A strong social aspect to eating is seen and loneliness is a major contributing factor to malnutrition. Individuals who have strong social network of family and friends are seen to be more physically and emotionally fulfilled and have better nutrition. The loss of eating companion such as spouse can affect the individual's desire to eat food. Depression, anxiety, loneliness can all lead to less desire to prepare and eat food and have been associated with anorexia, weight loss, increased morbidity and mortality in older people.

Living alone can also have impact on nutritional status. Homebound individuals are at particularly higher risk for malnutrition.

Functional factors: Functional disabilities such as arthritis, stroke, vision or hearing impairment can affect nutritional status indirectly. The older people may have difficulty going to grocery stores. Inability to handle eating utensils, see food clearly or hear conversations clearly may lead to social isolation, poor eating habits and subsequent malnutrition.

Pharmacological factors: medications and alcohol: Most elderly have several prescriptions and over the counter medicines daily. These drugs can interact with food and diet. Declining physiologic functions can keep drugs in body for longer period. Drugs can affect absorption and utilization of some foods and nutrients. Prescribed drugs are primary cause of anorexia, nausea, vomiting, gastrointestinal disturbances, xerostomia, taste loss and interference with nutrient absorption. These conditions can lead to nutrient deficiencies, weight loss and malnutrition.

Alcohol provides calories but is of little nutrient value and can undermine nutritional value by decreasing appetite.

Oral factors that affect diet and nutritional status.

Xerostomia (dry mouth or hyposalivation): Affects one out of five older people. Saliva provides natural protection to two hard and soft tissues of the mouth. When salivary levels decline teeth become more susceptible to dental caries. The exposed root surfaces of teeth are particularly at risk. Xerostomia can impair complete denture retention and is associated with increased periodontal diseases, burning or soreness of oral mucosa and difficulties in chewing and swallowing- all of which can adversely affect food selection and lead to poor nutritional status.

Altered sense of taste and smell: Age related changes in taste and smell can alter food choices and diet quality in some people. Factors contributing may include health disorders, medications, oral hygiene, denture use and smoking. More profound sensory alterations are seen. Olfactory dysfunction is associated with lower preference for sour, better and pungent foods. sensory changes may diminish the appeal of some foods limiting their intake and health benefits.

Oral infectious conditions: 47% of elderly show evidence of root caries and increased incidences of periodontal disease that may be exacerbate by nutritional deficiency[6].

Dentate Status: It can affect diet, nutritional status and general health. Reduced chewing ability is directly related to reduction in functional capacity and general health.

Effects of denture on taste and swallowing: A full maxillary denture can have impact on swallowing and taste ability. Hard palate contains taste buds, so taste sensitivity is reduced when maxillary denture covers the hard palate. It also becomes difficult to determine the location of food in mouth when hard palate is covered. As a result, swallowing can be poorly coordinated and dentures can become cause of death from chocking.

Effect of denture on chewing ability: As age increases the number of strokes for chewing increase. The degree of dental impairment determines chewing performance and food selection. There is difficulty in chewing food like raw carrots, steaks, chops fibrous meat, apples, salad and cooked vegetables.

Individuals with intact dentition chew the best followed by those with partially compromised or fully compromised dentition.

Effect of dentures on food choices, diet quality and general health: The effects of denture on nutritional status vary greatly among individuals. Some people compensate for decline in masticatory ability by choosing processed or cooked foods rather than fresh and by chewing longer before swallowing. Others may eliminate entire food groups from their diets. Nutritional intake of individuals with impaired dentition can also fall below minimum requirements if an already marginal pattern is subjected to sudden insults like illness, loss of taste, inability to chew or living alone.

When dentate status causes changes in food habits, nutritional status can suffer. As the degree of dental impairment increases, nutritional status decreases. Intake of vitamin A, fibre and calcium decline as the number of teeth decrease. Dentate adults tend to eat more fruits and vegetables than full denture wearers.

Replacing ill-fitting dentures with new ones results in significant improvement in dietary intake. Exchanging conventional complete dentures for implant supported dentures result in significant improvement in food selection and nutrient intake.

Changes in food habits associated with denture wearing may affect general health. Edentulous subject's diet contains fewer vegetables and less carotene and fibre and more cholesterol, saturated fat and calories.

Nutrition needs for the elderly

Water: It accounts for 70% of total weight of human body. Water accounts for main constituent of human blood and other body fluids. A normal healthy person requires 8 glasses of water daily. During the hot spell or vigorous physical activity, the requirement increases as a significant amount of water is lost through sweat.

Energy: Energy needs decline as age increases due to decrease in physical activity and decreased basal metabolism.

Cross sectional survey shows that average energy consumption of 65-74 years old women is about 1300 kilocalories (Kcal) and 1800 Kcal for men of the same age.

Energy deficiency causes dull, dry, easily plucked hair, muscle wasting, pallor, pale atrophic tongue, spoon nails and pale conjunctiva[7].

Calories: Reduced energy expenditure decreases caloric needs. The mean RDA for women is 1600 Kcal and 2400 Kcal for men[7].

Protein: As the patient ages, protein requirements increase. Protein depletion of body stores in elderly is seen primarily as a decrease of skeletal muscle mass. The RDA for protein, for person aged 51 years and over is 0.8gm/kg body weight/day (46 gms for females and 56 gms for males)[8]. Best sources are dairy products, poultry, meat and fish in boiled and not dried form. Nuts, grains, legumes and vegetables contain protein, which if eaten in proper combination.

Carbohydrates: Elderly consume large portion of their calories as carbohydrates, probably at the expense of protein, because of their low cost, easy availability, can be stored without refrigerator and ease of preparation. The recommended range of intake is 50-60% of total calories. Carbohydrates are present in cereals, vegetables and dairy products.

Fibre: An important component of complex carbohydrate is fibre, which promotes bowel function, may reduce serum cholesterol and is thought to prevent diverticular disease. Fibre in form of bran is frequently added to dry cereals and breads, but vegetable fibre is more important and less expensive. Reduced selection of food rich in fibre that are hard to chew, could provoke gastrointestinal disturbances in some elderly with deficient masticatory performance. A study conducted on impact of edentulism on nutrition and food intake, inferred that even 1 gram of difference in dietary fibre intake between the dentate and edentulous, could lead to approximately 2% increased risk of myocardial infarction[9].

Vitamin A: RDA for vitamin A is 800-1000 micrograms RE. It occurs in food in two forms: retinal or active vitamin A and beta carotene or provitamin A. Retinal is found in animal foods like liver, milk and milk products. Provitamin A is present in green and yellow fruits and vegetables like apricots, spinach and carrot. Vitamin A deficiency causes bitot's spot in eyes, corneal and conjunctival xerosis, dryness of skin, salivary glands and oral mucosa, follicular hyperkeratosis and decreased salivary flow. Chronic deficiency of vitamin A may cause hyperplasia of gums and generalised gingivitis.

Vitamin B complex

Thiamine: Thiamine deficiency occurs most commonly in poor, institutionalized and alcoholic group of elderly people. RDA is 0.5 per 1000 calories or 1 gram daily. Sources are meat, peas, whole grain, cereals and yeast. Its deficiency causes beri-beri.

Vitamin B6 (pyridoxine): 50-90 % of elderly are affected by vitamin B6 deficiency. It can be an important cause of carpal tunnel syndrome in elderly. RDA 1.2-1.4 mg. Its deficiency causes nasolabial seborrhoea and glossitis.

Vitamin B12 (riboflavin): Its RDA is 3.0 micrograms. Found in kidney, heart, milk, liver and green leafy vegetables. Its deficiency causes nasolabial seborrhoea, fissuring and redness of corners of eyes, magenta coloured tongue and genital dermatosis.

Vitamin C: RDA is 60 micrograms. Sources are citrus fruits, tomatoes, potatoes and leafy vegetables. Its deficiency causes scurvy, delayed wound healing, petechiae and painful joints.

Vitamin D: Lack of sun exposure causes deficiency of vitamin D in elderly. It is also found in liver fish oil. RDA is 5 micrograms. Its deficiency causes bowlegs and beading of ribs.

Vitamin E: Its deficiency is elderly does not seem to be a problem. Total plasma vitamin E levels increase as person ages. RDA is 8-10 mg alpha- TE.

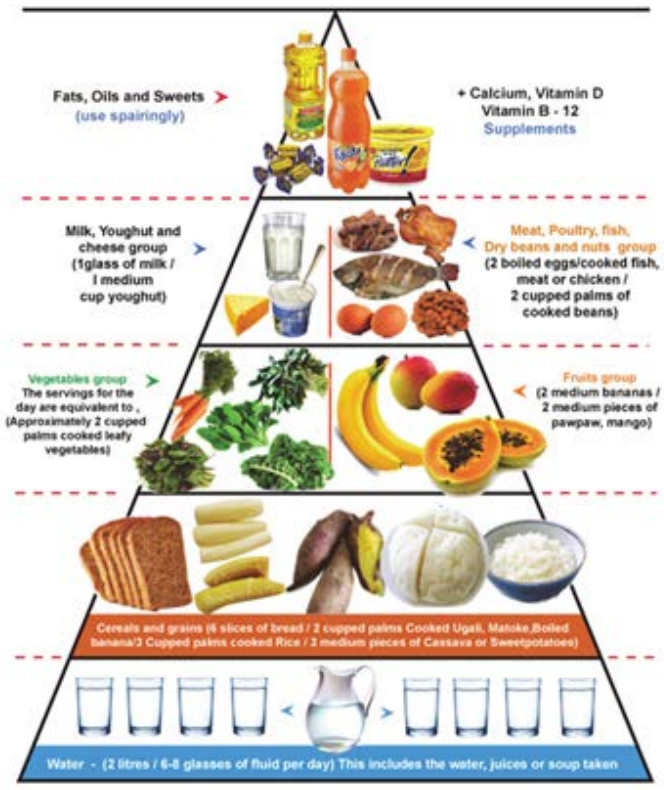
Minerals: A studied showed that there is increased deficiency of magnesium, fluoride, folic acid, zinc and calcium in elderly[10].

Folic acid: Their deficiencies are common in poor and institutionalize elder people. RDA is 500micrograms.

Sources are green leafy vegetables, oranges, liver, legumes and yeast. Deficiency of folic acid causes megaloblastic anaemia, mouth ulcers, glossodynia, stomatitis and glossitis.

Calcium: RDA is 800 mg/day. As calcium absorption decreases in elderly people it must be acidulated before digestion. Lactose deficiency results in lactose intolerance and is common in elders, this also makes it necessary to modify the milk for elderly people[10]. Sources are milk, milk products, dried beans, peas and tofu. Edentulous patients have excessive residual ridge resorption which is related to negative calcium balance and contributes to development of osteoporosis.

Iron: Prevalence of iron deficiency is rare among healthy elderly. If anaemia is found in older person, blood loss may be the cause. RDA is 10 mg. Sources include meat, fish, poultry, fortified breads, cereals, dried beans. Its deficiency causes burning tongue, angular cheilitis, dry mouth and anaemia.



Zinc: Its usage declines with age. Its intestinal absorption decreases after 65 years of age[11]. RDA is 5 mg. Sources are animal products and dried beans. Decreased taste sensation, mental lethargy and slow wound healing is seen as its deficiency.

Food recommended for elderly people. All the nutrients are required in desirable amounts for healthy living. This can be obtained by eating the variety of food in the following ways- Four servings of vegetables and fruits[13].

- Two servings of vitamin C such as citrus fruits, raw cabbage and green salad.
- One serving of provitamin A in deep green and yellow vegetables.
- One serving of potatoes and other vegetables and two servings of bread.

Four servings of enriched flour products, cereal and bread.

Two servings of milk and milk products.

Two servings of mat, fish, poultry, beans, peas, eggs and nuts.

Miscellaneous food such as sugar, fat, oil 2-4 tablespoon.

Diet for new denture wearers: The logical sequence of eating food is biting, chewing and swallowing and it is much easier for the new denture wearer to master this complex of masticatory movements in the reverse order. Consequently, food of a consistency that will require only swallowing, such as liquids, should be prescribed for the first few days after insertion of the denture. The use of soft foods is advocated for the next few days and a firm or regular diet can be eaten by the end of the week[14].

Post insertion day 1-

Vegetables and fruit juices.

Cereals cooked in milk or water.

Pureed meat, meat broth or soup.

Glass of milk once a day.

Post insertion day 2 and 3-

Tender cooked vegetables.

Fruit juices.

Cooked cereals, soft bread, boiled rice or noodles.

Milk once a day.

Chopped meat, ground liver, tender fish, thick soup.

Post insertion day 4 and after-

If the sore spots have healed, firmer food is given.

Food should be cut in small pieces.

Glass of milk is a must once a day.

Conclusion

Older patients are at the risk of poor nutrition. Any decrease in the ability to eat food increases the risk of malnourishment. Dental impairment can affect diet and nutrition. Problem varies with patient and with their dental condition, so suggestions must be made to meet patient's need.

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