



## Review Article

# Unlock your potential with good nutrition: A prosthodontist's outlook

Himanshu Aeran<sup>1,\*</sup>, Jyotsna Seth<sup>1</sup>, Megha Sagar<sup>1</sup>

<sup>1</sup>Dept. of Prosthodontics, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India



### ARTICLE INFO

#### Article history:

Received 03-06-2020

Accepted 05-06-2020

Available online 02-01-2021

#### Keywords:

Nutrition

Geriatric dentistry

Complete denture

Prosthodontist

### ABSTRACT

General and oral health is a fundamental right of human being. Good health is achieved by assimilation of healthy diet and this further helps in maintaining health of oral hard (teeth) and soft tissues. Many age related diseases are highly influenced by nutrition. Improper nutrition not only affects physical appearance but also it affects psychological status of patient. Chronic disease and most oral diseases share common risk factors. Diet plays a key role in disease prevention, as poor diets have been linked to illnesses, such as osteoporosis, atherosclerosis, and bowel disease. Prosthodontist is a geriatric dentist who interacts with more number of older people as compare to other profession. Therefore, the major role for a prosthodontist is to guide the older people regarding malnutrition, balanced diet and age-related diseases. In this literature review the outlines of nutrition, basic requirements of nutrition associate with aging have been discussed.

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## 1. Introduction

Nutrition is the science that interprets the nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excretion.<sup>1</sup>

The diet of an organism is what it eats, which is adjudged by the attainability and palatability of foods. For humans, a healthy diet must include the preparation of food and storage methods that preserve nutrients from oxidation, heat or leaching, and that reduces risk of foodborne illnesses. But most importantly having a balanced diet is a major concern, which includes the seven major classes of human nutrients i.e carbohydrates, fats, fiber, minerals, proteins, vitamins, and water, especially in the elderly population which increases at a very faster pace than any other population around the world.

But as we age, our body and life change, and so does what we need to stay healthy. Older persons are particularly vulnerable to malnutrition. Proper nutrition is not only

essential for maintenance of health and comfort of body in general but also of the oral health in particular. Presently, the dental needs of elderly patients have increased. Thus, for managing elderly patient clinician must acquires knowledge and understanding of both dental and medical aspects of ageing.

There will be a leap up in the chronic conditions and illnesses affecting not only oral, but also the systemic health of an individual, with increase in the life expectancy and the number of elderly people.<sup>2</sup> Alteration in oral health and function is commonly seen in older people.<sup>3</sup> The Government of India classified, the people who are 60 years of age and above as elderly whereas in developed countries the age is 65 years. However, India comprises of about 75 million aged population.

## 2. Indian Geriatric Population

The geriatric population which comprises 7.7% of the total population suggests that India is in a phase of demographic transition. According to the UN Population Division approximation, the geriatric population would double in Africa and treble in Asia with one-sixth population residing

\* Corresponding author.

E-mail address: [drhimanu@yahoo.com](mailto:drhimanu@yahoo.com) (H. Aeran).

in developing countries by 2050.<sup>4</sup>

Some of the peculiar features of the Indian geriatric population are:

1. The growth rate of elderly population is extremely high, as compared to the general population,
2. Women constitute a larger proportion of the elderly (52% of them are >60 years and 55% of them are >80 years of age).<sup>5</sup>
3. Rural areas constitutes about 80% of the geriatric population.<sup>6</sup>
4. About three-fourth proportion of the geriatric population is dependent on their own family members.<sup>7</sup>
5. Economically dependent portion constitutes 75% of the geriatric population.<sup>7</sup>
6. Around 9% of the geriatric population lives with their relatives or lives alone by themselves.<sup>7</sup>
7. The literate/educated portion is only about 28% (which is low compared to the national average).<sup>8</sup>

### 3. Geriatric Dentistry

The term geriatrics is derived from a Greek word “GERON” meaning, old man “and IATROS” means healer. It is also in relation to Sanskrit word “JARA” which means “old.” Elderly can be classified into three groups:<sup>9,10</sup>

1. Young old (65–74)
2. Older old (75– 84)
3. Oldest old (>85)

Geriatric dentistry or Gerodontics can be defined as the delivery of dental care to older adults involving the diagnosis, prevention and treatment of problems associated with normal ageing and age-related diseases as part of an interdisciplinary team with other health care professionals.<sup>11</sup> Whereas The study of the physical and psychological changes which is incident to old age is called gerontology and care of aged is called clinical gerontology or geriatrics.<sup>12</sup>

#### 3.1. Goals of geriatric dentistry

1. Maintenance of oral health of individuals.
2. To maintain ideal health and function of masticatory system by implementing adequate preventive measures.
3. Maintenance of oral and general health in diseased individuals.

#### 3.2. Objectives of geriatric dentistry

1. To recognize and relieve difficulties of elderly people<sup>13</sup>
2. Restoration and preservation of function for maintaining normal life in elderly patients<sup>14</sup>

### 4. Geriatric Dentistry and Nutrition

Oral Health is an intrinsic and inalienable part of the general health. In old age oral health comprises of maintenance of teeth in a healthy state, ability to chew well, improved sense of taste, certainty of clear speech, contributing to adequate nutrition, aiding in the digestive process encouraging socialization, well-being and quality of life. Since the majority of elderly suffer from various diseases imposing psychological and functional limitations, they must be provided with special care.

Many activities including the speech, deglutition and mastication is mediated by the oral cavity, affecting nutritional status not only in the ability to chew foods but also in the pleasure of eating. Consequently, the efficiency of the masticatory apparatus is a prerequisite in the maintenance of general health. In the geriatric population the masticatory efficiency is closely related to the nutritional status, which in turn is related to the general health, affecting the quality of life. Oral health status, nutritional status, and general health are interrelated. When dentition is compromised or dentures do not fit properly one experiences inefficient mastication leading to compromised nutrient assimilation affecting the nutritional status and overall health of the elderly. One must educate the patients about the negative impact of the nutritional quality, that affects the health and wellbeing in general for the geriatrics.

#### 4.1. Purpose of nutrition<sup>15</sup>

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

#### 4.2. Nutritional requirements for the elderly

Adequate nutrition, especially in older age, aids in the maintenance of health and in decreasing the onset of chronic diseases, contributes to vitality in everyday activity, to energy and mood and helps in maintaining functional independence.

An Indian diet constitutes energy mainly from plant food- based carbohydrates, fat and protein that are considered as macronutrients. While other nutrients are vitamins and minerals, which are considered as micronutrients. A well-balanced diet can provide required nutrients for different physiological groups.<sup>16</sup>

#### 4.2.1. Water

water constitutes the main component of our body. Water is present in our food and drinks. The most recommended drink is water! It is important to drink water in and between meals. Water, mainly tap water, also contains minerals, which are important for the body, e.g., calcium, magnesium and fluoride. A normal healthy person will require eight glasses (2 L) of water daily. Boiling for 10-15 min is a satisfactory method of purifying the water. Tablets containing 0.5 g of chlorine can disinfect 20 L of water.<sup>16</sup>

#### 4.2.2. Carbohydrates

Grains is the first group from which one has to eat a relatively large amount. Grains are foods that contain mainly starch (carbohydrates) and a certain amount of proteins. For example: bread, noodles, potatoes, oats, corn, wheat, groats, buckwheat, rice, morning cereals. Most of the foods in this group also contain fibers (especially when they are eaten as whole grain), vitamins and minerals. Carbohydrates provide energy of 4 kcal/g. Glucose and fructose are simple carbohydrates found in vegetables, fruits, and honey; whereas sucrose is found in sugar and milk contains lactose. Denture patients who prefer soft foods high in simple sugars and fat should be advised the importance of complex carbohydrates.

#### 4.2.3. Proteins

The daily requirement of protein is 0.8 g/kg body weight (60 g for males and 55 g for females per day).<sup>16</sup> Dietary proteins must provide eight essential amino acids in a proper proportion and in sufficient/required quantities to synthesize tissue proteins of the body. Protein rich foods this group contains meat products (source of iron), milk products (source of calcium), eggs and legumes (source of iron and calcium). The group provides other components: zinc, vitamin B12– in animal products, fiber – in legumes, Omega 3 – in fish. It is recommended to diversify and eat animal products (meat, chicken, fish, milk, eggs) and plant products (legumes like lentils, beans, humus). It is recommended to consume low fat foods: cheeses up to 5%, milk and yogurt 1-3%, lean, skinless meat products.

#### 4.2.4. Fiber

It is the remnants of the edible part of plants and is similar to carbohydrates. Dietary fiber is impervious to digestion and absorption in the human small intestine. Polysaccharides, oligosaccharides, lignin, and similar plant products constitute dietary fiber. An intake of 20-35 g fiber is recommended for long-term good health.<sup>16</sup> Cereals, seeds, beans, many fruits and vegetables, bran and whole grain are a source of fiber. Vegetables and fruits contain carbohydrates (sugars), water, fiber, vitamins and minerals. It is recommended to include vegetables and fruits of different colors in every meal. Vegetables contain less

sugar and calories compared with fruits; therefore, It is recommended to maintain a ratio of 2/3 vegetables and 1/3 fruits.

#### 4.2.5. Oil rich foods

This food group contains foods like oil, avocado, mayonnaise, nuts, almonds, olives, margarine, butter. These foods are important to one's health, but the body needs them in moderation. From this group it is recommended to use the foods rich in various types of unsaturated fats, like vegetable oils, instead of foods rich in saturated fat of animal sources (e.g., butter), or in plants (such as hard margarine). Cholesterol (of animal source) and trans-fat (from processed foods) are not recommended. Oil intake should not exceed 20 g.

#### 4.2.6. Minerals and vitamins

Minerals are inorganic nutrients essential for growth and health. These are calorie free and essential nutrients, which regulate many biological functions. Minerals such as iron, zinc, and copper aids in collagen formation, wound healing, and regulate inflammation.<sup>17</sup> out of which calcium and phosphorous are of prime importance to the geriatric population. The average needs of calcium over 60 years is 1500 mg daily, and of phosphorous 1 g/day. Elemental Ca: P ratio of 1:1 has to be maintained. Sources include milk and milk products, egg, meat, fish, millettage, green leafy vegetables. Milk is a rich source of bioavailable calcium. Milk fat serves as a vehicle for vitamins A, D, and E. whereas Vitamins are essential organic and calorie free molecules necessary for human body. They are further classified as fat-soluble and water soluble vitamins

To sum up, the Elderly must include protein-rich foods such as pulses, egg-white, toned milk, and foods rich in calcium, fiber, and micronutrients. Other than pulses and cereals, elderly need minimal 200- 300ml of milk and milk products daily, and 400g of fruits and vegetables for fiber, antioxidants, and micronutrients. Eggs and flesh foods improve the diet quality. The diet should be properly cooked, less salty, spicy, and soft. Food should be consumed in smaller quantities at regular intervals and sufficient water to be consumed to prevent dehydration hyponatremia.<sup>18</sup>

#### 4.3. Dietary/ nutritional evaluation

The nutritional status of the edentulous patients using either a mandibular conventional denture or an implant-supported overdenture for the past one year was evaluated by Muller et al in 2008. No significant dissimilarities were observed between two groups. However, conventional denture wearers found chewing of hard food materials more difficult.<sup>19</sup>

1. The first priority while evaluating nutrition is to understand the differences in metabolic functioning

of an individual and how his metabolism reacts to a particular diet. To achieve this one must intervene personally to gather information regarding food policies, health requirements, and Dietary Reference Intakes for nutrient needs as well as recommendations. All of the above can be ascertained by inspecting the following fields:

a) **Omics research:** Nutrigenetics and Nutrigenomics viz. epigenetic, transcriptomics, proteomics, and metabolomics fall under this category of research. The prime objective of this research is to gather information about relation between certain nutrients, genes and metabolism that determines the health of a person. This helps us to determine how specifically a nutrient interacts with genes, proteins, and metabolites that anticipates an individual's health.

b) **Micro biome:** Since several microorganisms resides in the human body. It becomes necessary to conduct research for determining their role in metabolism, responsiveness of body to certain nutrients, diet, diseases, etc.

c) **Biological networks:** This include the study of an individual's genes, effect of biological network on food responsiveness, and other environmental factors such as micro-organisms, pollution, chemical ingredient, etc.

d) **Tissue specificity and temporality :** A reliable and dependable research must be done in this field since the effect a diet has on growth, and health is an important field of research and tissues play a prime role in it.:

2. Secondly, the factors to be taken into consideration about the effect of nutrition of growth and development includes:

- a) Energy balance,
- b) Epigenetic,
- c) Nutrition and reproductive health
- d) Nutritional effect on geriatric patients and studies of these nature.

Since the Social, psychological, and financial status of a person plays a huge role in determining nutritional intake. Food habits of the geriatric patient must be observed since it becomes very difficult to alter such habits especially in elderly.

3. Research and development in the field of medical management and disease progression<sup>20</sup>

## 5. Role of Prosthodontists while Providing Geriatric Dental Care

Presence of teeth is not a necessary requirement in healthy individuals for proper digestion. However, edentulous subjects with poor masticatory function consume more medications than those with better masticatory function for their digestive problems. Adherence to a specific diet and an unbalanced diet can be an outcome of the impaired

masticatory function in elderly individuals. Several other oral conditions such as painful mucosal disorders, oral dryness(xerostomia) contributes to nutritional problems, apart from masticatory efficiency.<sup>21</sup>

An adequate dentition either natural or artificial is not always essential for sufficient food intake for maintaining balanced nutrition in normal health, but is necessary to support extra demands of illness and aging. Prosthodontist is in a strategic position to evaluate and correct nutritional deficiencies that promote premature aging of oral tissues by providing a functional prosthesis. A prosthodontist needs to understand and appreciate the demands of the aging patient providing the best prosthetic treatment to meet his expectations and helping him toward optimal health and a happier life.

The quality of denture wearing patient can definitely be improved by diet counseling. Creating nutrition awareness and referral to physician or dietitian when required is of utmost importance. Patient education in dental facts should be life-long for everyone. If the Prosthodontist give their patient constant educational facts on their oral health and changes in life, then patients can understand better the importance of prevention and maintaining regular dental visits, adapting in to the prosthesis in a more appropriate way.

### 5.1. Nutritional status of complete denture patients

As the upper palate is covered in a maxillary complete denture prosthesis, the elderly individual may experience reduced sensitivity. This decreases the pleasure in eating and reduces nutritional intake.<sup>22</sup> This has been more obvious among those wearing full dentures rather than partial denture users. Vitamin A and Vitamin C deficiencies are observed more in them. Vitamin D deficiency in elderly is a cause of metabolic bone diseases while edentate women consumed more fat as per studies.<sup>23,24</sup> At the same instant , the palliated adjustment of the dentures is determined by the salivary flow of a person and its ability to act as a lubricant for setting the dentures. This in turn is affected by aging and is related to mental and physical changes that come along with it.<sup>25</sup>

### 5.2. Nutritional recommendations post-insertion of a denture<sup>26</sup>

#### 5.2.1. First day

Juices is recommended in Vegetable fruit group.

Bread cereal group in form of gruels cooked in either milk or water Milk products, Eggs, Meat soup

#### 5.2.2. Second day & third day

Vegetable fruit group - in addition to fruit and vegetable juices, tender cooked fruits and vegetables (skin and seeds must be removed) cooked carrots, tender green beans.

Bread-cereal group: cooked cereals such as cream of wheat and softened bread; boiled rice. Milk products Meat group: Fish, soft cooked chicken.

### 5.2.3. Fourth day

Raw vegetables and sandwiches are the foods least preferred by denture wearers but in fact it requires more force during mastication.

## 6. Conclusion

Oral health of patient determines the general health, and general health determines happiness in life that brings smile. Proper nutrition is an important aid in preventive medicine in geriatric people in which the practicing prosthodontist can play a vital role. Geriatric patients are influenced by personal beliefs, behaviors, and attitudes to health care. The practicing dentist must understand this realm as well as the functional and technical aspects of dentistry. Maintenance of good health and nutrition of older patients are necessary for the success of complete denture prosthesis.

## 7. Source of Funding

None.

## 8. Conflict of Interest

The authors declare no conflict of interest.

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## Author biography

**Himanshu Aeran**, Director Principal, Professor & Head

**Jyotsna Seth**, Professor

**Megha Sagar**, PG 3rd Year

**Cite this article:** Aeran H, Seth J, Sagar M. Unlock your potential with good nutrition: A prosthodontist's outlook. *Int J Oral Health Dent* 2020;6(4):246-250.