

Geriatric Oral Health: A Review Article

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Abstract:

Oral health is not separate from general health, but maintaining oral health is definitely difficult and different in old age. Even though, few elderly have physical and/or mental situation that call for particular interest in the dental workplace, one should not presume that all elderly community shares these circumstances. In order to achieve health, it is necessary to know few aspects of old age. In due course of old age body tissues get harder, collection of waste products in body cells and loss of lubrication leads to impaired functions of various organs. The design and implementation of comprehensive preventive dentistry protocols for elders presents the dental profession with many challenges. Although a specific protocol must be tailored to meet the unique needs of the individual patient, there are certain factors common to elderly segment of the population that may influence these protocols.

Key Words: Elderly, home dentistry, oral health, tooth loss

Introduction

Aging is a natural process. Old age should be regarded as a normal, inevitable biological phenomenon. As a result of the advances made in medicine and public health measures in the last half of the 20th century, there is a substantial increase in the life span of man. Elders above 65 years (old age) have health problems as a result of aging process, which calls for special consideration.¹

During the latter half of the 20th century, the age composition of the population changed dramatically, with more people living to older ages and the older population getting older. This demographic change will have a major impact on the delivery of general and oral-

health care, as well as on the providers of these services. Although some older adults have physical and/or psychological conditions that require special attention in the dental office setting, one should not assume that all older people share these conditions.^{1,2}

According to the WHO, the global population is increasing at the annual rate of 1.7%, while the population of those over 65 years is increasing at a rate of 2.5%. Both the developed, as well as the lesser-developed countries, are expected to experience significant shifts in the age distribution of the population by 2050. The fastest growing population segment in most countries is the adults older than 80 years, which according to the United Nations estimates will make up nearly 20% of the world's population.^{1,2}

In India, with its population of over one billion people, people older than 60 years constitute 7.6% of the total population, which amounts to 76 million. Incidence of oral cancer, which is an old age disease, is highest in India.³

Of added concern may be the presence of systemic disease that not only influences the patient's ability to maintain oral hygiene and promotion of oral health, but can actually be related to the occurrence of certain oral diseases. Though impairments are not life threatening, they affect a person's quality-of-life. Thus, planning treatment for the senior dental patient includes an understanding of the chronic diseases the patient lives with daily, as this play a critical role in the acceptance and success of the dental treatment plans.

The "elderly" segment of the population

1. People aged 65-74 years are the new or young elderly who tend to be relatively healthy and active;
2. People aged 75-84 years are the old or mid-old, who vary from those being healthy and active to those managing an array of chronic diseases;
3. People 85 years and older are the oldest-old, who tend to be physically frailer. This last group is the fastest-growing segment of the older adult population.

There is a sudden blast of the "65 plus" population in the last decade, and India is no exception to that.⁴

Oral Health Status in Aged

Nutrition in old age and its implications for oral care

Adequate nutrition is a vital factor in promoting the health and wellbeing of the aged. Inadequate nutrition may contribute to an accelerated physical and mental degeneration. Poor oral health

can be a detrimental factor to nutritional status and health. Disorders of the oral cavity have contributed to poor eating habits in the elderly. Loose painful teeth or ill-fitting dentures may result in a reduced desire or ability to eat. A compromised nutritional status, in turn can further undermine the integrity of the oral cavity are closely interrelated, diet and nutrition should be considered as an integral part of the oral health assessment and management of the elderly.

Caloric requirements usually decrease in the elderly because of a decline in the basal metabolic rate, brought on by reduced lean muscle mass and lower exercise levels. Appetite and food intake may also decrease, leading to an insufficient caloric intake and frequently results in insufficient consumption of calcium, iron and zinc more frequently in females. Approximately 8000 kJ (1900 kcal) is the required calorie requirement in 80 years old. An active elderly subject requires a protein intake of 0.97 g/kg of body weight per day. However patients suffering from tissues necrosis or inflammation shows an increase in protein turnover and requirements. Among the vitamins, most nutrients are recommended in the same amounts for elderly as for younger people. However, certain groups of elderly, such as those homebound, with no access to sunlight, may have insufficient vitamin D and develop osteomalacia. The other important nutrients required by the older individuals are ascorbic acid, iron, and potassium.⁵

Dental status is considered to be an important contributing factor to health and adequate nutrition in elderly. Missing dentition and ill-fitting dentures cause difficulty in chewing and perception of taste of foods.

Although chewing efficiency and nutritional status improve when inadequate dentition or edentulousness is corrected with partial or complete dentures, with these replacements, mastication is less efficient than with intact natural dentition. Denture status may contribute to dietary changes to soft; easily masticate certain foods, which are often high in fermentable carbohydrates that may predispose to the development of root caries lesions.⁵

The dentists are hence in an ideal position to contribute to the well-being of the elderly population. Dentists should be alert to nutritional risk factors in the elderly population and by careful screening can intervene in the early stages of nutritional problems when such interventions can be most valuable and effective.

Changes in salivary glands and salivary secretion with aging

The diminished function of salivary gland is commonly associated with aging. The implications of disordered salivary gland maintenance of oral health. The presence of saliva protects the oral cavity the upper airway and digestive tract and facilitates numerous sensorimotor phenomena. The absence of saliva thus has many deleterious consequences to the host.

With advancing age, there is an atrophy of acinar tissue, a proliferation of ductal elements and some degenerative changes in the major salivary glands. These alterations tend to occur linearly with increasing age. Minor salivary glands also undergo similar degenerative changes with advancing age. Thus, there is a normal, uniform decrease in the acinar content of salivary gland tissue accompanying the aging process.⁶

However, it is difficult to make a general conclusion about age-related status of fluid output from salivary glands. It appears that decreased salivary flow does not uniformly accompany the aging in healthy persons. These functional observations contrast with morphologic changes seen in aging salivary glands. One explanation that has been hypothesized to account for this is that salivary glands possess a functional reserve capacity, enabling the glands to maintain a constant fluid output throughout the human adult life span.⁶

The main oral health problems of old age that is mouth dryness and dental caries have been attributed to the reduced salivary flow.

Age changes in oral mucous membrane

The oral mucosa performs essential protective functions that profoundly affect the general health and well-being of the host.

A decline in protective barrier function of the oral mucosa could expose the aging host to myriads of pathogens and chemicals that enter the oral cavity during daily activities.

Both histologic layers of the oral mucosa, the epithelium, and connective tissue, have important defensive functions. A stratified epithelium, containing closely apposed, attached cells, and constitutes a physical barrier that interferes with the entry of toxic substances and microorganism. Mucosal epithelial cells also synthesize several substances that are critical for maintenance of the mucosal surface, such as keratin and laminin.⁷

Oral mucosal surfaces also possess a protective self-cleansing mechanism provided by the natural turnover of the epithelial cells.

Earlier studies report that the oral mucosa becomes increasingly thin, smooth with age and that it acquires satin like edematous appearance with loss of elasticity and stippling. The tongue in particular is reported to show marked clinical changes and to become smoother with loss of filiform papillae. With age, there is a tendency for development of sublingual varices and an increasing susceptibility to various pathological conditions such as *Candidal* infections and a decreased rate of wound healing.⁸

An additional complication in evaluating oral mucosal status in older persons is the use of prosthetic appliances, which

have considerable potential to alter mucosal integrity if not maintained properly.

Changes in the teeth with aging

The gradual changes taking place in the dental tissues after the teeth are fully formed are referred to as age changes. Most of the tissues have a physiological turnover of their components but however, some tissues do not exhibit any turnover such as the enamel.

The macroscopic changes taking place with age in the teeth change in form and occur with age. Wear and attrition affect the tooth form. The perikymata and imbrication lines are lost, giving the enamel surface a flat appearance with less detail than in newly erupted teeth.

The altered surface structure gives the teeth in older individuals a different pattern of light reflection, which causes a change in the observed color. Changes in the dentin, both in quantity (thickness) and quality also result in a gradual loss of transparency. Pigmentation of anatomical defects, corrosion products and inadequate oral hygiene may also change the tooth color.⁸

All the changes in enamel are based on ion-exchange mechanisms. It becomes less permeable and possibly more brittle with age. The nitrogen content of enamel is showed to increase with age. No explanation could be offered to account for the increase in organic material, but probably the filling in of the cracks by organic material (acquired lamellae).

A two age dependent change takes place in dentin:

- i. Continued growth, referred to as physiological secondary dentin formation.
- ii. Gradual obturation of the dentinal tubules referred to as dentin sclerosis.

The dental pulp in teeth from old individuals differs from that in younger teeth by having more fibers and fewer cells, and hence reduces in volume.

The blood supply, including the rich plexus of capillary loops in the subodontogenic region, is greatly reduced. These changes are important because the pulp cannot be expected to have the same reparative capacity as the younger teeth. Electron microscopy of old pulps has shown loss and degeneration of both myelinated and unmyelinated nerves and thus affected the healing capacity of pulp. Pulp calcifications are also found to increase in frequency, number and size with age. Diffuse calcification and narrowing of the root canals with increasing age.

Cementum apparently continues to be laid throughout life, but the rate of formation diminishes with age. Under some circumstances, excess amounts of cementum may be formed

(hypercementosis) associated with accelerated elongation of an unopposed tooth or to an inflammatory stimulus.

Furthermore increase in the fluoride and magnesium content is seen with age. The cementum may contain one of the very few biomarkers of age. Countable, microscopically clear annular rings have been found in teeth that might aid in age determination in forensic specimens.

Age changes in morphology of teeth have important clinical implications as these changes may influence the outcomes of the restorative treatments and also have a great bearing on the reparative responses.

Aging and periodontal disease

Globally, the percentage of the subjects with community periodontal index scores 4 (deep pockets) ranges from approximately 5-70% among older people.⁹ Periodontal diseases are among the most prevalent chronic conditions in dentate older populations. Several epidemiological surveys have found that the prevalence and severity of periodontal diseases increase with age.

Periodontal disease in the elderly does not appear to be specific disease but the result of a chronic adult periodontitis since adulthood although age-related changes have been documented in the periodontium of elders, these changes do not appear to be the cause of periodontal disease in the elderly. Enhanced severity of periodontal diseases with age has been related to the length of time the periodontal tissues have been exposed to the dentogingival bacterial plaque and is considered to reflect the individual's cumulative oral history. However, the susceptibility of the periodontium to plaque-induced periodontal breakdown may be influenced by the aging process or by a specific health problems of the aging patient.¹⁰

At the biological level, aging is associated with changes that lead to a progressive, irreversible deterioration of the functional capacities of several tissues and organs. Changes in structure and function during aging may affect the host response to plaque microorganisms and may influence the rate of periodontal destruction in older people. The greater amount of plaque recovered in the elderly subjects could be due, in part, to a larger area for plaque retention because of the gingival recession. Further, exposed cementum of the root surface and dental enamel constitute two unlike types of hard dental tissues with distinct surface characteristics, which may influence the plaque formation rate differently. Differences in dietary habits, increased flow of gingival exudate from the inflamed gingiva and possible age-related changes in salivary gland secretions may similarly alter the conditions for growth and multiplication of the plaque microorganisms.

Prosthetic considerations in geriatric dentistry

In many industrialized societies, more than 50% of the elderly population are edentulous.⁷ Deciding the treatment and determining the prognosis are influenced by various systemic and local factors as well as person's previous experience with dentures.

The most important determinants are:

- Debilitating diseases: As a consequence, people often totally neglect oral and prosthetic care. This situation may have serious implications in providing satisfactory dental care. Thus, prosthetic treatment should be postponed until the person's general health is restored. For chronically ill patients maintenance of oral hygiene as a way to control caries and periodontal disease is the most applicable treatment option.⁸
- Neurophysiological changes: Functional elements in the central nervous system degenerate with advancing age. These changes limit the person's capacity for acquiring new muscle activity patterns. Elderly people, therefore, adapt more slowly to prosthetic treatment and learn new muscle activity patterns.
- Mental changes: The presence of mental disorders in elderly patients may complicate the outcome of prosthetic treatment. Patients may acquire quite aberrant conceptions of what can be achieved by prosthetic treatment.
- Oral physiological changes: Progressive atrophy of the masticatory, buccal and labial musculature is a sign of aging. In the denture wearer, however, this process is often accelerated. Atrophy of the masticatory muscles may severely reduce chewing efficiency, which cannot be sufficiently improved through prosthetic treatment. Instead, it is important to advise the person on how to attain an adequate diet that is easy to chew.

Reduced salivary secretion or xerostomia is frequently a complicating factor of debilitating diseases such as diabetes or of treatment with psychotropic agents. This results in rampant caries loss of denture retention and traumatic lesions and infections of the oral mucosa. Meticulous oral hygiene supplemented by mouthwashes with chlorhexidine and daily use of artificial salivary substitutes are important means to reduce complications to denture wearing in people with xerostomia.⁶

Schou *et al.* (1982)¹¹ observed a significant relation between denture plaque and presence of stomatitis.

The effect of prosthetic management in geriatric dentistry is determined by a number of factors such as the patient's degree of cooperation, the financial resources available for care, the biological and technical quality of prosthetic materials.

Preventive dental care for elderly people

The design and implementation of comprehensive preventive dentistry protocols for elders presents the dental profession

with many challenges. Although a specific protocol must be tailored to meet the unique needs of the individual patient, there are certain factors common to elderly segment of the population that may influence these protocols.

Need for preventive services

Although the elderly are retaining their dentition longer than in the past, dental morbidity prevalence of dental diseases continues to be high. Presence of root caries, periodontal disease and xerostomia are oral diseases that are found majorly affecting the older population. Despite these conditions affecting the elderly being treatable or preventable, many of the elderly do not avail the needed treatment. This may be because, most of the current older than 60 were not introduced to the concept of preventive dentistry at a young age and thus are not inclined to it. Many still hold the opinion that tooth loss is a normal part of the aging process and is not preventable. Others have adapted to a compromised oral health status and seek treatment only when an emergency arises.

Problems of providing preventive dental care for elderly people

One of the major challenges in providing restorative as well as preventive care for elderly people is to develop an appreciation of the need for regular care.¹² Globally, poor oral health among older people has particularly been seen in a high level of tooth loss, dental caries experience, high prevalence rates of periodontal disease, xerostomia, and oral precancer/cancer.¹³ The basis of prevention is related to detecting disease at the earliest possible stage, which requires regular patient contact. The many factors that are known to influence older people's utilization of dental services directly or indirectly can be divided into four main categories.

1. Illness and health related factors
 - Oral health status.
 - Experiencing discomfort.
 - General ill health.
 - Mobility, functional limitation.
2. Socio-demographic factors
 - Place of residence.
 - Education.
 - Income.
 - Age.
 - Sex.
 - Culture.
 - Ethnicity.
3. Service-related factors
 - Accessibility.
 - Dentist behavior.
 - Dentist attitude.
 - Price of service
 - Satisfaction with service.
 - Transport.
4. Attitudinal or subjective factors.

- Personal beliefs.
- Feeling no need, perceived need.
- Perceived importance.
- Fear and anxiety.
- Resistance to change.
- Perceived financial strain.
- Satisfaction with dental visits.

Preventive Dentistry Components

Mechanical plaque removal

Several reports worldwide have shown that use of professional dental health services is low among older people, particularly among the socio-economically disadvantaged.¹⁴ The preferred method of brushing for most elders is sulcular brushing with soft toothbrush (Bass method). Persons with gingival recession should be instructed to observe certain precautions avoid further recession or cemental abrasion. These may include the use of an extra soft toothbrush, use of light pressure, modification of the brushing method. The plaque retention in the elderly is exacerbated by the presence of restorations, missing teeth and gingival recession. The wearing of removable dentures may also negatively influence plaque accumulation. In addition, they often face difficulty in mechanical removal of plaque because of reduced manual dexterity or impaired vision or due to physical limitations associated with conditions such as stroke, Parkinson's disease or severe arthritis.

The elderly person should be helped to develop the ability to brush effectively and thoroughly. Those who have diminished manual dexterity may benefit from the use of traditional mechanical toothbrushes, rotary electric toothbrushes, or manual brushes that have been adapted or customized for each person.

Rinses

A therapeutic rinse contains an agent that is beneficial to the tooth surface or oral environment. Therapeutic rinses may contain chlorhexidine, sodium benzoate, sanguinaria, a fluoride, or other remineralizing agents, which can enhance oral disease and should be recommended to the elderly when appropriate.¹⁵

Chlorhexidine rinse has numerous applications for treatment of elderly. It is primarily indicated for gingivitis. However, it is effective against a variety of plaque bacteria, thus enhancing the patient's mechanical plaque control efforts. This is especially important for patients with physical and mental disabilities. It also reduces oral mucositis and candidiasis in immune suppressed patients such as those on intensive chemotherapy.

Fluoride has known to prevent the development of caries through three important mechanisms. The first, it inhibits the development of caries by being incorporated into the developing enamel in the form of fluorapatite. Secondly,

it enhances remineralization of the carious enamel. Third, fluoride has an anti-bacterial action. Thus fluorides in the form of gels, varnishes, rinses, or dentifrices play an important role in the prevention in caries prone older patients.¹⁶

Remineralizing rinses can be used in an elderly person who continually experiences new coronal or root carious lesions as a consequence of severe xerostomia. This replaces the calcium and phosphate lost from enamel or cementum. This is most effective when used with topical fluorides.

Plaque control for the elderly with physical limitations

Many elderly persons are hampered in their efforts of effectively performing plaque control procedures by physical disabilities that result in the lack of manual dexterity or impaired range of motion of the wrist, elbow or shoulder. Their plaque removal efforts may be enhanced by use of an electric device or by adaptation of manual plaque control aids.

Electric devices

This can be an invaluable aid for the elderly when used properly. These devices have enlarged handles, which may be grasped more easily than the standard manual toothbrush handle. The major advantage derives that they are motor driven, thus requiring little or no arm or wrist movement, and the need to make consistent movements. Some of the electric plaque removal devices are designed in such a way that the action stops if too much pressure is applied. However, an elderly person who has congenital heart disease or any condition affecting heart valves should be cautioned about the danger of developing subacute bacterial endocarditis secondary to soft tissue trauma caused by improper use of electrical devices.

Adaptive aids

If an elderly person's grip is weakened by a condition such as an arthritis, they encounter difficulty in grasping the slender handle of a conventional toothbrush, floss holder, or other home care aid. To enable the patient to perform effective plaque removal, the handle can be enlarged or built up so that it can be grasped easily and comfortably.

Denture care

Many edentulous elderly believe erroneously that once all their teeth have been extracted they no longer need to be concerned about oral health. The elderly who wear dentures should be taught proper home care of both dentures and tissues on which they rest as well as the need for continued professional care.

The tissues can be prevented from harm by avoiding wearing the denture constantly. An instruction for the removal of the denture while retiring for the night is essential. The cleaning and massaging of the tissues under a denture at least once a day increases circulation and thus enhances the health of these tissues.

Elderly persons who wear full or partial denture must be taught to clean these appliances in a way that is effective. Immersion of denture in cleansers is the recommended method that ensures safety against damage of the denture material. The patient should be instructed always to brush and rinse the denture thoroughly before and after soaking in immersion cleans.

Counseling and education

Preventive dentistry counseling for the geriatric patient includes two components:

- Education
- Motivation

Patient education includes a discussion with the patient of the causes of current and past disease and means of intervention and prevention of future disease. Discussion of etiology should be complete, but appropriate to the level of understanding of the individual elderly person.

When one is providing instruction in home care procedures, whether teaching the elderly person himself or a caregiver, a simple yet effective model the dentist should practice a simple yet effective model.

Tell---Show---Do

1. Tell or explain the procedure:
2. Show or demonstrate the procedure:
3. Finally, the learner can do or practice the technique until he has mastered the skills involved in performing it effectively.¹⁶

The last step is the most important one if the learner is to develop proficiency.

Counseling and adherence

Possession of preventive knowledge and skills alone will not ensure the elderly person's attainment of the goal of preventive counseling that is, maintenance of optimal oral health status. The dental professional and patient must establish a therapeutic alliance, whereby each is committed to performing the activities necessary to achieve this goal. The patient must be convinced that ultimately only he can help himself by adhering to the recommended preventive measures. The dentist should work to dispel the misconception that oral disease is an inevitable consequence of aging, and that; consequently, the attempt to prevent oral disease is a futile effort.

Thus, the oral health services should be organized and developed to secure adequate early detection, prevention and treatment of oral health problems for all elderly people, whether living at home or in hospitals or in institutions. The achievement of such a service goes beyond what the dental profession can do alone. It requires the involvement of other health professionals, health care workers of the elderly people.

However, it presents a realistic goal that could assure good quality of life and a reduction in the dental expenses for the elderly patients.

Conclusion

The major block in oral health care of elderly and the residents would be the underestimation of the oral health care need by them. The dental care of the residents is often limited to emergency care and is not aimed at retaining teeth. Conversely, with changing attitudes the oral health goal should include: Keeping their teeth, keeping their teeth healthy and keeping their teeth pretty.

The best option to serve the residents would be "home dentistry or domiciliary dental care," however it is yet an infrequent practice in India. Surveys should be conducted in this sector very routinely to spot the residents in the need of oral care circumscribing nursing homes, old age homes, ashrams, secure units, and community households.

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