

Geriatric Dentistry

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DOI: <http://dx.doi.org/10.13005/bpj/649>

(Received: August 15, 2015; accepted: September 20, 2015)

INTRODUCTION

Human life consists of childhood, adolescent, middle age and old age. Aging is a natural process. Old age should be regarded as a normal, inevitable biological phenomenon. The twentieth century witnessed remarkable changes with regard to human longevity worldwide, and the twenty-first century is set to carry forward the gains in longevity further, both in the developing and the developed world¹.

According to the WHO, the global population is increasing at the annual rate of 1.7 percent, while the population of those over 65 years is increasing at a rate of 2.5 percent. 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 percent of the world's population².

In India, there were 55.30 million elderly people in 1991 and 70 million in 1999. This number is projected to be 96 million in 2011, 177 million by 2025 and quadruple over the next 50 years. Moreover, the growth rate of elderly population (37.3%) is twice (16.8%) that of the general population. As a result of the increasing life

expectancy, the proportion of the elderly in the total population is projected to be around 20% in India and 32% in the developed nations by 2050³.

The demographic shift in the Indian population has serious health implications. Increase in longevity means that the community will have to bear a greater burden of disease, with a gradual transition toward the diseases of the elderly and the disabilities associated with aging. The physiological decline that occurs with ageing affects manual dexterity and this, coupled with reduced muscular tone, hampers adequate clearing of food particles from the oral cavity; in addition, there is likely to be gingival recession and increase in interdental spaces, which predisposes to increase in plaque retentive sites, all of which make the maintenance of optimum oral health difficult. In addition to this, there are changes in the oral ecology due to compounding factors (such as deficiencies in knowledge, attitudes, practices, socioeconomic status, systemic health, etc.) that increase the pathogenic potential of the oral microflora and predispose the elderly to oral health problems. Substantial increase in the number of elderly in India, accompanied by rising prevalence of dental illness, indicate that in future dentists will be required to treat an ever-growing proportion of elderly patients in their practice and will have to make appropriate adjustments and advancement in their professional skills⁴.

During the last decade, the special dental care needs of geriatric patients have been the subject of many research efforts. Understanding the interactions between the systemic health problems and disease trends of the elderly and their oral health has helped the dental profession gain greater insight into treatment strategies tailored to their needs. Hence in this review, details about geriatric dentistry has been collected and presented in a systematic manner for better understanding of this subject.

Geriatric patients are suffering from several diseases like hypertension, diabetes, muscle atrophy, in addition to this, dental diseases like periodontal disease, root caries, early loss of teeth, will add to the already existing systemic diseases. Hence in this Library Dissertation an attempt has been made to review the oral health problems of elderly people and how to find solutions for these problems.

Geriatric dentistry

American Association of dental Schools (AADS) defined geriatric dentistry as that branch of dentistry, "that deals with the special knowledge, attitudes and technical skills required in the provision of oral health care to older adults". The term older adults has no specific Chronological boundary, rather it refers to adults who are affected by physical, social, psychological, physiological and/or biological changes associated with aging, with or without concomitant disease.

Depending upon the degree of impairment, older adults may be classified as functionally independent and frail or functionally dependent.

Gerodontology

Is defined as the multidisciplinary study of the process of aging in the oro-facial area and its relation to the surroundings.

Manifestations of Aging

Individuals vary considerably in both the rate and magnitude of age related changes in cells, tissues and organs. The time of onset of age dependent changes varies, as well as the patterns of change. Alterations in one system or structure do not always signal aging of the whole organism, but

any deterioration in one organ system must influence changes in other organs. Some functions shows predictable decline with age such as vital capacity, cardiac output, renal plasma flow, glomerular filtration rate, swallowing, tongue function, taste acuity and reaction time to mention a few. The rate of yearly loss seems to occur at about 0.8% to 0.9% of the functional capacity present at 30 years of age. Other functions, such as pH and electrolyte content of blood and verbal intelligence show no age-associated changes ⁴.

The aging process may then be defined "*as the sum of all morphologic and functional alterations that occur in an organism and lead to function impairment, which decreases the ability to survive stress*" ⁵.

Biologic theories of aging

Aging is the process of growing older and includes changes in both biology and psychology. Biology refers to the way the body functions. Psychology describes how the mind functions. How people age has to do with genetics, environment, and lifestyle over a lifetime. The process of aging is complex, and may derive from a variety of different mechanisms and exist for a variety of different reasons. Many theories of aging presume that a single mechanism is responsible for all the characteristic changes seen with aging, focusing only on the derangements that occur at some target molecule.

Genetic theories

Error theory

A stochastic theory of aging that ascribes aging to the accumulation of errors in the process of information flow from genes to proteins. The errors create faulty proteins that do not function normally, resulting in impaired cell function and death.

Somatic mutation theory

This theory states that an important part of aging is determined by what happens to our genes after we inherit them. From the time of conception, our body's cells are continually reproducing. Each time a cell divides, there is a chance that some of the genes will be copied incorrectly, this is called a mutation. Additionally, exposures to toxins, radiation or ultraviolet light can causes mutations

in your body's genes. The body can correct or destroy most of the mutations, but not all of them. Eventually the mutated cells accumulate, copy themselves and cause problems in the body's functioning related to aging.

Theory of Redundancies

Medvedev suggested that aging is attributable to loss of unique, non repeated, genetic information from the genome. The repetitions of some genes, the bulk of which are repressed to reduce the rate of aging.

Genetically programmed senescence theory

Programmed senescence theory was developed by Bernard Strehler, who proposed that as cells differentiate to perform specific functions within the organism, they lose some of the ability to translate their genetic information, and that this eventually will lead to senescence. Although the specific mechanisms invoked by this and other theories of programmed aging are now of little more than historical interest, they served to establish some important concepts.

Disposable soma theory

The *Disposable soma* theory, proposed in 1977 by Thomas Kirkwood, presumes that the body must budget the amount of energy available to it. The body uses food energy for metabolism, for reproduction, and for repair and maintenance. With a finite supply of food, the body must compromise, and do none of these things quite as well as it would like. It is the compromise in allocating energy to the repair function that causes the body gradually to deteriorate with age.

Oral manifestations of aging⁵

Loss of teeth	Primarily due to degeneration of periodontal structures.
Attrition	Rate is influenced by diet and masticatory habits (bruxism)
Oral mucosa	Loss of elasticity with dryness and atrophy. Tendency to hyperkeratosis.
Gingivae	Loss of stippling. Edematous appearance. Keratinized layer thin or absent. Tissue friable and easily injured.
Saliva	Diminished function of salivary glands with relative or absolute xerostomia due to atrophy of cells lining the intermediate ducts. Xerostomia also results in abnormal taste sensations and stomatodynia.
Tongue	Atrophic glossitis. Probably due to concurrent vitamin B complex deficiency.
Lips	Angular chelosis is very common and probably is related to concurrent vitamin B complex deficiency and closed bite. Chelitis and "purse-string" mouth due to dehydration.

Nongenetic theories

Immunologic theory

According to this theory, programmed decline in the functioning of the immune system leads to increased vulnerability to infectious diseases thus causing ageing and death. With aging, the immune system tends to be less able to distinguish normal molecules from abnormal one, and so abnormal cells may proliferate and autoimmune actions take place.

Free radical theory

First introduced by R. Gerschman, but was developed by Dr. Denham Harman. According to this theory, accumulated damage caused by oxygen radicals cause cells to stop functioning and eventually organs also stop functioning. Oxygen free radicals are ubiquitous, short lived, highly reactive chemicals produced during normal metabolic reactions. This theory postulates that free radicals combine with essential molecules, causing damage to DNA or other cellular aging and age associated diseases.

Cross-linking theory

According to this theory, the accumulation of cross linked proteins damages cells and tissues and slows down bodily processes resulting in aging. In a process called non enzymatic glycosylation, glucose molecules attach themselves to proteins resulting in a chain of chemical reactions. This causes protein cross-linking, thus altering their biological and structural roles. Cross links toughens the tissues and may result in stiffening of connective tissue, hardened arteries, clouded ages and loss of nerve function and less efficient kidneys.

Metabolic rate or wear and tear theory

It has been proposed that an increased metabolic rate, which presumably would result in greater wear-tear on the organism, result in a shorter life span. Thus Sacher has calculated that, those species that have lower metabolic rates, have longer life span. Thus old age is inevitable but need not be debilitating. Identifying and understanding the underlying cause or causes of senescence would be beneficial for intervening in and slowing the aging process, thus allowing for a longer period of well-being during a person's life, with relatively quick denouncement⁵.

Nutrition in Old Age and its Implications for Oral Care

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 development of root caries lesions. Nutrition is also known to influence periodontal disease occurrence although, its precise role in the cause and progression has been difficult to delineate. Nutritional factors can affect the host susceptibility to periodontal disease and its progression. Oral health makes eating enjoyable as well as possible and can greatly improve the quality of life for the older individual. The dentists are hence in an ideal position to contribute to the well being of the elderly population. Dentists should be alert to nutritional

General health and oral health changes⁵

1	Mental diseases including parkinsonism and dementia	<ul style="list-style-type: none"> •High levels of caries experience •Tooth loss •Periodontal disease •Experience of pain •Chewing difficulties •Poor function of dentures
2	Visual impairment	<ul style="list-style-type: none"> •Dental caries •Gingival bleeding •Reduced ability to maintain oral health
3	Xerostomia related to systemic disease, head and neck radiations, or multiple/ regular use of medications	<ul style="list-style-type: none"> •Dental/ root caries •Candidiasis •Impaired mastication, swallowing and speech
4	Inadequate nutrition	<ul style="list-style-type: none"> •Periodontal disease •Tooth loss •Poor oral hygiene •Masticating function and swallowing •Taste perception •Oral dryness •Oral pain, Oral cancer
5	Weight loss	Edentulousness
6	Respiratory disease: <ul style="list-style-type: none"> •Chronic obstructive pulmonary disease •Aspiration pneumonia 	<ul style="list-style-type: none"> •Poor oral hygiene •Periodontal disease •Difficulty swallowing
7	Cardiovascular disease: <ul style="list-style-type: none"> •Coronary heart disease •Stroke 	<ul style="list-style-type: none"> •Tooth loss •Severe periodontal disease
8	Diabetes mellitus (type1, type2)	Severe periodontal disease

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 effective⁶.

Peterson PE (2005)⁷ in their survey of 65-74 year-old in Madagascar observed the mean number of DMFT was 20.2, untreated dental caries was high (DT-5.3), While the number of restored teeth was low FT-(0.4)

Vehkalathi MM, Paunio IK (1988)⁸ stated dental caries was a major public health problem in older people. The pattern was mostly seen in persons of low income, Individuals who do not brush their teeth frequently, consume smoke, tend to suffer more from coronal and root surface caries.

Megashyam et al (2005)⁹ reported the mean DMF in their study done in Belgaum, Karnataka where the mean DMFT values are (22.37, 20.71, 29.48 in 55 – 64, 65 – 74 and > 75 years age group respectively.)

Prevention

Predictive prevention

The dentist should carefully observe the patient as he or she enters the door of the office and proceeds to sit in the dental chair. If the patient shuffles with his or her feet, he will shuffle with his mandible, and his denture will have to be altered. The ataxic gait of the stroke victim alters the dentist to management problems with partial dentures. Pallor is a sign of anemia. Swollen ankles may be a sign of heart disease. If a patient arrives at the office out of breath and unable to lie back in the contour chair he may have a breathing difficulty, such as orthopnea or even emphysema.

Clinical prevention

The chair side method used should be interceptive: an attempt to help arrest and retard the problem and if possible, eliminate it. Careful discussion with the physician can help with problems caused by medication. Fluoride as well as other palliative treatment, can be given. The three R's of dentistry – repair, remove, replace – should be adhered to. When the dentist is dealing with nursing home patients and chronically ill patients,

this rule should be amended to repair, reline and possibly ignore. The use of overdentures should often be considered.

Empirical prevention

A trial and error method is often necessary because a condition is rare and/or little etiology perhaps a placebo will be of value. The patient feels that something is being done and his or her complaints are not being totally ignored.

Conservative prevention

Healthy tissues can be preserved if the foci of infection are removed, the mouth is cleaned up and maybe, the mouth is left edentulous. Primum non nocere – do no harm. For an elderly patient the dentist should consider adequate instead of complete dentistry, even when the fee is not a problem. He should explain why to the patient to avoid misunderstanding. The dentist's aim should be to provide comfort, nutritional support and perhaps a cosmetic appliance for occasional use. Patients should be on a recall program.

Endogenous prevention

The body's natural defences provide such preventive measures as: natural repairs, such as healing of radiolucencies; natural resistance and reactions such as keratosis and hypercementosis; natural replacement functions, such as fibrosis.

Educational prevention

Continuing education for the dentist and his staffs, and less dependence on gadgets and drugs, is important. Good preventive programs should be developed for all patients, with brushing, flossing, and home care taught. The dentist can help improve the patient's health by suggesting exercise and giving information about the mouth and advics on nutrition. The dentist must talk to the patient needs to listen and follow suggestions. Self- help with a view to preserving self – respect and dignity, can be encouraged⁶.

Oral health programmes for older people

Clinical and community-based intervention projects have focussed on strategies and approaches in improving oral health care in older people. Such projects particularly considered

the control of dental caries and periodontal disease in non institutionalised and institutionalised population groups.

Community -based health promotion and oral disease prevention

Oral health programmes have been designed to improve the oral health status of the institutionalized elderly. For example, an oral health care programme established for residents of nursing homes or long-term care facilities provided oral examination, dental treatment, oral prophylaxis, and instructions to both nursing staff and residents and the programme demonstrated a reduction in the number of teeth with decay and in periodontal treatment need, reduced prevalence of denture stomatitis, and improved denture hygiene. Toothbrushing by nurses and caregivers combined with professional oral care by dentists or dental hygienists were associated with decreased pneumonia, febrile days, death from pneumonia and improved daily living activities and cognitive functions of institutionalized older people. Some programmes focused on education of caregivers for improved oral health status of institutionalized elderly, and tried to break down practical, informational, and psychological barriers to caregivers' provision of oral care for residents, the result being improvement in the caregivers' knowledge, attitudes and oral health care of the elderly as well as in the oral health status of the residents.

Successful community-based oral health programmes for older people have been reported. A dental health promotion programme based on the concept of Predisposing, Reinforcing, and Enabling Courses in Educational Diagnosis and Evaluation (PRECEDE), resulted in significant improvements in the oral health status of a volunteer group of healthy elderly persons. Furthermore, oral health promotion programmes addressing self monitoring approaches improved oral health behaviours, attitudes and health status among elderly persons. Modifications in oral health care systems by elimination of financial barriers and establishment of outreach services have been shown to improve the oral health of active older people. A public health programme providing free, comprehensive dental care to old-age pensioners

resulted in improvement of their oral health status and quality of life. The programme aimed at empowerment and selfcare capacity building of older people and enhanced their attitudes, knowledge and oral hygiene practices, and in addition increased their use of dental health services⁷.

WHO and oral health of elderly people

In 1995, in response to the global challenges of ageing populations, the World Health Organization (WHO) launched a program on ageing and health. It was designed to advance knowledge about health care in old age through targeted training and research efforts, information dissemination and policy development. The World Health Report 1998 emphasized the need to strengthen health promotion amongst older people. In 2000, WHO reiterated the priority of health for older people through the programme 'Ageing and Life Course', which focussed on the concept of 'active ageing'. In 2002, WHO issued a document entitled 'Active Ageing – A Policy Framework', which outlines the essential approaches towards healthy ageing. The proposed policy framework rests on three basic pillars: health, social participation and security. When risk factors for chronic diseases and functional decline are minimized and protective factors are maximized, people enjoy longer life and higher quality of life. Where labour market, employment, education, health and social policies and programmes support full participation.

Strategies towards improving oral health of elderly

Globally, important mechanisms for better oral health would relate to strengthening oral health policy development; national capacity building within oral health care for the underserved; education and training for service and care for the elderly, and research for oral health.

WHO Oral health policy

As emphasized in the World Oral Health Report 2003, WHO sees oral health as integral to general health and as a determinant for quality of life. The interrelationship between oral health and general health is particularly pronounced among older people primarily because several oral diseases have risk factors in common with chronic

diseases. Today, few countries have clearly stated policies and goals specifically for oral health promotion and oral health care for older people. Generally speaking, oral health policies and programmes should be an integral part of national and community health programmes. Thus, in many countries – developing and developed – strengthened analysis for policy and analysis of policy are urgently needed for advocacy, legislation, goalsetting, and design of public oral health programmes for old-age persons. Oral diseases can be prevented through shared public health approaches. Oral health planners and administrators are encouraged to use the common risk factors approach to integrate interventions for oral health among older adults into general health programmes. A benefit of this approach is the focus on improving health conditions for the whole population as well as high risk groups such as older adults, thereby alleviating inequities. WHO developed two global strategies for prevention of chronic disease; Global Strategy on Diet, Physical Activity and Health, and Global Strategy for Chronic Disease Prevention. These strategies are intended to serve as guidelines for countries to strengthen prevention of disease, which also would apply to strengthening oral disease prevention through integrated approaches.

Oral health intervention programmes

Advocating oral health intervention programmes to administrators of retirement villages and nursing homes can qualify decisions affecting the oral health of residents. Such programmes can also serve to educate older people, non-dental health professionals including physicians, nursing personnel, nutritionists, social workers and policy makers, prompting perceptions of oral health as an integral part of general health and quality of life.

Research for oral health of elderly

There is no doubt that oral health professionals and researchers in recent years have become more aware of and pay more attention to older people as a group. Dental associations,

scientific societies, and educational and political organizations have published many documents on aging and oral health. However, systematic efforts must be made to translate existing knowledge into practice and operational research on outcomes of oral health intervention programmes are urgently needed for policy development.

CONCLUSION

The geriatric population is the most rapidly growing segment of the general population. Many elderly people experience oral mucosal, dental, periodontal and alveolar diseases. The need for dental services is high in elderly age group. Therefore oral health care practitioners must be able to identify, manage and prevent these problems in order to enhance the quality of life of elderly people.

The lack of social support, in many instances and feeling of loneliness and isolation may affect the elderly mental health and well being. There is a need to provide sensitive oral health services that are accessible, appropriate and acceptable to them. Effective information sharing between oral health professional and oral health care disciplines is critical for efficient health care for elderly. Enhanced quality of life and continuity of care by suitably trained assistants is a practical solution to provide appropriate dental service¹⁰.

Dental education programs must also provide more training opportunities to prepare dental professionals to meet the needs of these pa-tients. It is of utmost importance for dental professional to be well-trained and compassionate, to be aware of special needs of mature population and provide special facilities and equipments in the treatment of elder population.

In order to create awareness among dental professionals regarding the oral health problems of elderly people and hoe to solve this problem, an attempt has been made in this review to share the information required in this regard.

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