Review Article

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Dentistry Section

Growing Old is Mandatory But Growing Up is Optional: An Explanation to Geriatrics

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ABSTRACT

Growing old is an inevitable process and aging graciously requires a healthy body where oral cavity occupies an important place. Geriatric dentistry is a specialized multidisciplinary branch of general dentistry designed to provide dental services to elderly patients. The rise in life expectancy has attributed to the substantial reduction in mortality which brought about by improved health care facilities, sanitation, environmental and public health reforms coupled with better hygiene and living conditions. The goal of geriatric treatment is to achieve optimal oral health, thus enhancing overall health. This begins with a concerted effort between the patient and the healthcare and dental teams. When medical problems exist, the physician and other involved healthcare professionals should be consulted, as these diseases can affect the safety and efficacy of various dental treatments. Thus a unified approach should be followed to assist geriatric patients to maintain optimal oral health and a high quality of life. Here in, this article we have reviewed the categories geriatric patients are divided to, various aging theories, changes occurring in various systems with their effects on system along with the various dental effects and age changes in them and treatment needs and strategies' concerning the elderly population.

Keywords: Aging, Dental effects, Geriatrics

INTRODUCTION

"Growing old is mandatory but growing up is optional "as said by Carroll Bryant [1]. Every individual is born to age and die one day. Aging is associated with a number of physical, mental and physiological changes along with health issues. If an individual is healthy they would age graciously. Thus growing up depends on an individual's health condition.

As individual ages many changes occur in both physical appearance and metabolic processes. It is thought that this process reflects the inability of individual cells to replicate themselves beyond a certain point as well as diminished metabolic cellular activity. The aging process affects each person differently [1,2].

The dental management of the elderly population is different from that of the general population because special considerations for age-related physiological changes along with the complications of chronic condition/therapy, increased incidence of physical/mental disabilities, and social concerns are required. Therefore, special knowledge, attitudes, and skills are necessary to provide oral health care to the elderly. Geriatric dentistry, as part of general dentistry, emphasizes dental care for the elderly population. It focuses upon older patients with chronic, physical and/or psychological changes or disorders [3].

Geriatric dentistry is a specialized multidisciplinary branch of general dentistry designed to provide dental services to elderly patients [4].

Goal of geriatric treatment

Is to achieve optimal oral health, thus enhancing overall health i.e. enable "successful ageing" [5].

Objectives of geriatric dentistry [6]

1. Recognize and relieve difficulties concerned with the aged individuals.
2. Adopt a humanitarian attitude & develop a better relationship and understand the feelings and attitude of the aged.
3. Restoration and preservation of function.

Special considerations during dental care among elderly [7,8].

1. Patient desires, needs and expectations should be given utmost importance.
2. Severity of patient's dental problems should be evaluated keeping in mind the symptoms, pathology and aesthetics.
3. Improve the quality of life by increasing the ability to eat, the comfort level and aesthetics of the patient.
4. Prognosis of the treatment outcome should be explained.
5. Ability to tolerate treatment stress & use of less extensive alternatives.
6. Patients capability to maintain oral health & if they are well motivated to carry hygiene measures independently or require assistance.
7. Patient's financial resources, Life span and family support – physical, psychological or financial.

Barriers to Oral Health for Older Adults [9]

1. Financial insufficiency could cause inequity to dental treatment and substantial lack of insurance coverage for oral health care of older people.
2. Transportation is a serious barrier to oral health care of older people; use of mobile dental units or portable equipment can facilitate outreach to older people and ensure effective service.
3. Education/Awareness about dental treatment & incorporation of age related oral health concerns into the promotion of general health may facilitate the development of oral health care for older people.
4. Social and family support issues for the willingness of family members to provide care may be bolstered by supportive services.
5. Dietary and Lifestyle Factors as they are mostly exposed to malnutrition due to impaired digestion and absorption, altered requirements, excess nutrient loss which leads to reduced immunity, delayed healing decreased, muscle strength along with psychological effects leading to depression.
6. Shortage of Dentists to provide specialized, quality care for aged adults. The health professionals should be educated and trained in gerontology.

GERIATRIC AGE GROUP

Paul M Insel et al., 1996 gave a medical Classification for the elderly:

a). Elderly fit: Those that are able to manage their own life.

b) Elderly infirm: Those with some physical defects preventing them managing their own life.

c) Elderly Sick: Those needing hospitalization for their ailments preventing them from managing their own life.

d). Elderly Psychiatric: Those with mental problem and cannot manage their life.

e). Special Group: This refers to elderly with some disabilities including the blind, deaf etc [10,11].

Sharon K. Inouye et al., gave chronological classification of old age based on how long an individual lived as:

Older Age: - 51- 65 y; Middle age: 40- 50 y of age; Young 20- 30 y of age [12].

Timothy Nichols, Wendy Rogers, Arthur Fisk and Lacy West at the Georgia Institute of Technology reviewed the age classifications. They came up with the following grouping:

Old-old 75 and older; Older 60-74; Middle-aged 40-59; Young 18-39

However, the researchers in the United States and other developed countries have subdivided old age as shown below:

Young Old 65- 74 y; the middle Old 75- 84; the old old 85 and above.

Thus we can say ageing is a relative term [13].

AGEING

Ageing is a progressive, deleterious and intrinsic phenomenon in an organism. It is defined as progressive generalized impairment of function resulting in loss of adaptive response to stress and a growing risk of aging associated disease [14].

It refers to any time-related continuous process that starts at conception and continues until death. Thus mechanisms involved in ageing are partially intrinsic to the organism (like genetic and epigenetic factors) and partially to the external origin (nutrition, radiation, temperature and stress) [Table/Fig-1,2].

THEORIES OF AGING

Many separate mechanisms that potentially affect ageing which have been recognized as:

1. Oxidative stress theory

During anerobic metabolism by electron transport chain in mitochondria there is production of ATP along with certain reactive oxygen species (ROS). These ROS in moderate amount have properties which leads to control of ventilation, nerve transmission, and immune regulatory processes.They are also activation of NF-kappa Beta via tumor necrosis factors and interleukin-1 and in regulation of mitogen-activated protein kinase pathways which affect cell function, growth and development. But high levels of ROS may be incompletely neutralized by antioxidants within the cell, resulting in indiscriminate damage to cellular constituents (lipids, proteins and DNA; ROS levels may increase in damaged or aged mitochondria and cause accumulation of ROS beyond physiological levels. Thus, increasing the damage [15].

2. Many substances have been identified that act as biomarkers of ageing such as:

Lipofuscin [14]: Lipofuscin is an aggregate of oxidized proteins that accumulates progressively mostly in aged post mitotic cells. There is gradual and steady accumulation of this intracellular yellow-brown fluorescent pigment & is considered as a hallmark of aging [16].

3. Advanced glycation end products (AGE) – In non-enzymatic reactions of glucose and other reducing sugars with amino groups of proteins and nucleic acids that results in alteration of the protein and nucleic acid structure and is function. It is associated with declining organ functioning and is implicated in the development of chronic degenerative diseases like cardiovascular disease, Alzheimer's disease and diabetes mellitus related complications [17].

It is still not clear whether these proteins are physiologically relevant or whether they serve as mere markers.

4. Accumulation of DNA damage- with age and that this may be due to an increase in production of reactive oxygen species (ROS) and a decline in DNA repair capacity with age. Mutation or disrupted expression of genes that increase DNA damage often result in premature ageing [18].

Progeroid syndromes or premature ageing syndromes are cited as examples to elucidate the role of DNA damage in ageing which accelerate physiological decline and the development of age-related diseases and not limited to cancer only. Higher DNA damage may trigger cellular signaling pathways, such as apoptosis which causes faster depletion of stem cells [15].

Changes with aging	Clinical consequences
Central Nervous System	
Neuronal loss Cochlear degeneration Increased lens rigidity Lens opacification Anterior horn cell loss Dorsal column loss	Increased risk of confusion High tone hearing loss Abnormal near vision Cataract Muscle wasting & weakness Reduced position & vibration sense
Respiratory system	
Reduced lung elasticity and alveolar support Increase chest wall rigidity	Reduced vital capacity and peak expiratory flow Increase residual volume Reduced inspiratory reserve volume Reduced arterial oxygen saturation
Reduced immune function	Increased risk of infection
Cardiovascular System	
Reduced maximum heart rate Dilatation of aorta Reduced elasticity of condition capacitance vessels Reduced no. of pacing myocytes in sinoatrial node	Decrease exercise tolerance Widened aortic arch on radiographs Widened pulse pressure Increased risk of postural hypotension Increased risk of arterial fibrillation
Endocrine	
Detoriation in pancreatic beta cell function	Increased risk of impaired glucose tolerance
Renal system	
Loss of nephrons Reduced glomerular filteration Reduced tubular function	Impaired fluid balance Increased risk of dehydration/over load Impaired drug metabolism and excretion
GIT	
Reduced motility	Constipation
Bones	
Reduced bone mineral density	Increased risk of osteoporotic fracture

[Table/Fig-1]: Age changes and the clinical consequences in various organ systems in human body [19]

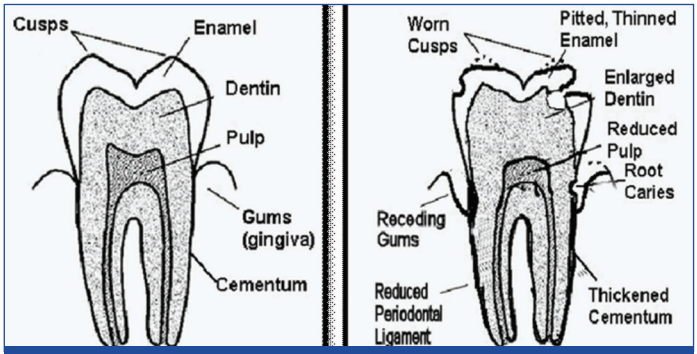
[Table/Fig-3&4] Schematic diagram showing loss of tooth structure with age

Strategies toward improving the quality of oral health amongst elderly 20]

- Conduct patient-specific, oral health risk assessments on old patients and identify medical treatments, oral conditions and diseases that impact overall health.
- Identify and prioritize strategies to prevent or mitigate risk impact for oral and systemic diseases.
- Recognize options and strategies to address oral health needs by a comprehensive risk assessment and health evaluation amongst elderly.

Enamel	Physical loss – wear & erosion
Dentin	Increase in secondary & tertiary dentin with more dead tracts with sclerotic dentin Secondary dentin so darker hue
Pulp	Reduction in size Fewer blood vessels and nerves Decreased response to trauma, Reduced immune competency
Periodontal ligament (Pdl)	Width decreases with age, responsive to load – which is due to loss of teeth
Dento gingival junction	Longer in tooth with age Apical migration of the Pdl Increases with age
Alveolar bone and connective tissues	Horizontal and vertical bone loss Osteoporosis in post menopausal women
Oral mucosa	Epithelium is thin & less keratinized loss of collagen Loss of tongue papillae & taste buds
Salivary glands	Loss of function and fatty degeneration, decrease in quantity and composition of saliva
Taste	Decline in ability to detect salty, bitter & fine tastes Affected by smoking, dentures & medications
Swallowing	Reduced tongue strength Atrophy of alveolar bone – chewing strength Increased swallowing time

[Table/Fig-2]: Age changes in dental Tissues



[Table/Fig-3 & 4]: Schematic diagram showing loss of tooth structure with age.

- Formulation of oral health policies and programmes to be an integral part of the treatment for people who urgently require treatment.
- Education and continuous training must ensure that oral health care providers have skills in and a profound understanding of the biomedical and psychosocial aspects of care for older people.

CONCLUSION

All the above mentioned facts highlight the need for education in geriatric dentistry, which will enable dental professionals to understand, document, plan, and deliver need-based oral health care to our elderly population.

The educational programme should-

(i) empower professionals with the knowledge and skills to provide oral health services with empathy,

(ii) Create awareness of the special needs of the elderly: like transportation to a dentist's office requires assessment of activity levels, continence, transfer time, communication, appointment timings, duration of appointment, and legal and ethical considerations.

Awareness and knowledge would facilitate the setting up of separate health care units for the elderly along with oral health care clinics and involvement of multidisciplinary teams, mobile oral health services, domiciliary services in the urban and rural areas, and provision of systematic oral health care.

Thus Aging gracefully isn't always easy, but attitude matters a lot which, where physical and mental health adds on to the well being of the elderly population.

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