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Ageing and Health– A Review

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Dental care is vital to maintain natural teeth and enhance the quality of life for elderly people. Preserving good oral health starts early in life by developing healthy lifestyles, practicing appropriate self-care, and regularly using oral health services when available.

The overall objective of dental therapy is to preserve dentition by preventing the progression of dental diseases. It should be integrated into overall health management of all geriatric patients and its maintenance is crucial to stability and functional health of the tissues. This review is intended to provide brief layout on diseases seen in older population, so as to render a professional service.

KEYWORDS: Ageing, Geriatric, Elderly, Oral Health

INTRODUCTION

The world's population is in transition, but there is an inevitable move in all societies towards an aging population. Ageing is a universal phenomenon associated with deteriorating health status. It is said that nobody grows old merely by living a certain number of years. With the passage of time certain changes take place in an organism leading to morbidities, disabilities and even death.¹ Elderly persons show lot of variation in age-related physiological decline and medical disorders. The age-related decline in muscle strength, vision, memory, locomotion, nutrition, immunity and homeostasis progress slowly.² The boundary of old age cannot be defined exactly because it does not have the same meaning in all societies. Government of India adopted 'National Policy on Older Persons' in January, 1999. The policy defines 'senior citizen' or 'elderly' as a person who is of age 60 years or above.¹

Currently the old age population in India is around 8% amounting to over 80 million and expected to reach 12% in 2025. The world population of elderly individuals is expected to reach 830 million by 2025, of which India alone will contribute to 110 million, which means one out of every 7 aged persons in the world will be an Indian.³

The term Geriatrics stems from a Greek word "GERON" meaning, old man' and "IATROS" means healer. It is cognate with "JARA" in Sanskrit which also means 'old'.³ Geriatric dentistry is the branch of dentistry that emphasizes dental care for the elderly population and focuses upon patients with chronic physiological, physical and/or psychological changes or morbid conditions/ diseases.⁴ (according to Taiwan Geriatrics & Gerontology) .It is a specialized multidisciplinary branch of general dentistry designed to provide dental services to elderly patients. A geriatric patient requires health and social support services to attain an optimal level of physical, psychologic and social functioning.

"Geriatric dentistry is the delivery of dental care to older adults involving diagnosis, prevention and treatment of problems associated with normal aging and age related diseases as part of an interdisciplinary team with other health care professionals" (acc. to Mulligan R.)

Three groups of older subjects are identified. (1) Young old (65 – 74) (2) Older old (75 -84) (3) Oldest old (greater than 85). This definition and grouping of the elderly is based on chronological age rather than biological age,

although the latter makes more sense.³

Geriatrics and health issues

As a biosocial issue, aging is also the underlying basis of almost all major human diseases, such as atherosclerosis, cancer, cardiovascular defects, cataract, diabetes, dementia, macular degeneration, neurodegeneration, osteoporosis and sarcopenia.⁴ Aging may increase patients' risk of developing systemic diseases such as diabetes mellitus, lung disease, heart disease and stroke. Clinical conditions, such as hypertension, anticoagulation therapy, and hypoglycemia, can trigger emergency crises during dental treatment.^{1,4}

Elderly people are also highly prone to mental morbidities due to ageing of the brain, problems associated with physical health, cerebral pathology, socio-economic factors such as breakdown of the family support systems, and decrease in economic independence. The mental disorders that are frequently encountered include dementia and mood disorders. Other disorders include neurotic and personality disorders, drug and alcohol abuse, delirium, and mental psychosis.⁵

An elderly person poses tremendous challenges to health as they suffer from debilitating medical conditions as well as from a high prevalence of oral health problems. In India, the elderly people suffer from dual medical problems, i.e. both communicable as well as non-communicable diseases. Globally, poor oral health among older people has particularly been seen in a high level of tooth loss, dental caries experience and high prevalence rates of periodontal disease. The incidence of oral cancers and consequent mortality increases above age 65.

Diet is implicated in all aspects of oral health and diet related diseases such as diabetes increase the risk of tooth loss whereas lifestyle habits, such as smoking, increase the risk of head and neck cancers and obesity are associated with increased risk of mortality and morbidity, including decreased mobility. According to the Government of India statistics, cardiovascular disorders account for one third of elderly mortality. Respiratory disorders account for 10% mortality while infections including TB account for another 10%. Neoplasm accounts for 6% and accidents,

poisoning and violence constitute less than 4% of elderly mortality with more or less similar rates for nutritional, metabolic, gastrointestinal (GI) and genitourinary infections.^{2,6,7}

Often there is no clear demarcation between normal physiological aging and pathological diseases. Losses of tooth translucency and surface details (e.g. perikymata and imbrication lines) pulp stone formation, and sometimes sclerosis of root canals are common changes during aging but caries and periodontal disease remain the two major dental problems in elderly patients. Abrasion, attrition, and erosion of teeth also increase with advancing age. It is not known whether older individuals are more susceptible to periodontal infections compared to other age groups. As gingival recession increases, resulting in exposure of root surfaces to the oral environment, the prevalence of root surface caries increases in the dentate elderly population.⁸

Mostly oral changes experienced by the elderly are not the result of ageing process itself, but are the consequences of systemic diseases, pharmacotherapy, functional disabilities, and cognitive impairment. Thus, the management of the oral problems in elderly patients does not depend on the development of new technical skills, but rather on the knowledge of biological, psychological and social aspects of age-related changes and disease-related changes; and the role of an interdisciplinary team.⁹

Geriatric syndromes

Five geriatric syndromes¹⁰ have been identified as the centerpiece of comprehensive geriatric assessment. Colloquially termed the “geriatric giants” or the “5 I'S”, these syndromes include: impaired mobility and falls, impaired cognition, impaired homeostasis, incontinence and iatrogenesis. It is the overlap of these syndromes that often characterizes elderly patients' illnesses.

1. Impaired Mobility and Falls

Thirty percent of community-dwelling people over age 65 years fall each year. This percentage increases with older age and with nursing home residence. Fallers experience greater declines in function and social activities, use more health care resources and are at higher risk for institutionalization than non-fallers. Social and physical activities are often restricted. Identified

risk factors for falls are older age, Caucasian race, cognitive impairment, medication use, stroke, arthritis, foot problems, dizziness and impairments in muscle strength, balance and gait. Modifying medication is an important risk-reducing intervention, with special emphasis on drugs that impair alertness such as long-acting benzodiazepines, barbiturates, antidepressants and neuroleptics. Anti-hypertensives and diuretics may increase the risk of falling by causing orthostatic hypotension and dehydration.

2. Impaired Cognition

Impaired cognition in elderly people encompasses dementia, delirium and depression. The prevalence of dementia is 3-11% in community dwelling elderly people over 65 years of age, increasing with advancing age and institutionalization to as high as 47%. Dementia is characterized by the loss of cognitive function of sufficient magnitude to interfere with social and occupational functioning. It comes from 2 latin words that translate as “away” and “mind”. Dementia is the development of multiple cognitive deficits that include memory impairment and at least one of the following:

- (i) Aphasia
- (ii) Apraxia
- (iii) Agnosia
- (iv) Disturbance in executive functioning

3. Impaired Homeostasis

Impaired homeostasis, a concept forwarded by Rowe in 1985, is an age-related reduction in the function of multiple organs leading to a decrease in the total self-regulating capacity of the elderly individual. Elderly people are more prone to dehydration at times of decreased oral intake, as the aging kidneys have impaired urine-concentrating ability, and older patients have a diminished thirst response. As normal change of aging, elderly individuals lose perception of high-frequency sounds as well as pitch discrimination.

4. Incontinence

Urinary incontinence is a common problem in elderly people that can diminish quality of life and lead to social isolation, depression, skin breakdown and falls and precipitate institutionalization and caregiver stress. Treatment of urinary incontinence is directed at modifying reversible factors such as improving

restricted mobility or treating urinary tract infections.

5. Iatrogenesis

It is the decrease in health status as a result of medical care. Common iatrogenic illnesses can be caused by hospitalization, labelling and adverse drug reactions. The challenges of drug prescribing for elderly people are further complicated by the presence of multiple chronic conditions requiring multiple medications.

ORAL FINDINGS IN AGING

Oral health reflects overall well-being for the elderly population. Compromised oral health may be a risk factor for systemic diseases commonly occurring in age. Conversely, elderly patients are more susceptible to oral conditions due to age-related systemic diseases and functional changes/decay.

An increased loss of epithelium attachment and alveolar bone in the elderly may be a result of an increase in dental plaque and calculus. As gingival recession increases, resulting in exposure of root surfaces to the oral environment, the prevalence of root surface caries increases in the dentate elderly population.

Oral mucosa conditions also are more prevalent among elderly populations. Candida infection and denture related lesions are common oral manifestations in geriatric patients. The oral cavity of elderly patients is also vulnerable to viral infection (e.g., Herpes simplex and Herpes zoster), autoimmune-related disorders (e.g., erosive lichen planus, pemphigus vulgaris, pemphigoid), and burning mouth (syndrome) due to immune dysfunction, nutritional deficiencies, chronic conditions, and cognitive alterations. The incidence of oral cancers also increases with advancing age.^{7,8}

Dentin undergoes a reduction in thermal, osmotic, and electrical sensitivity and pain perception, and its susceptibility to caries decreases. Cementum thickness and pulp dimensions are reduced with age. Secondary dentin deposition, pulpal calcifications, external root resorption, increased density and volume of pulpal collagen fibers, and diminished nerve supply all contribute to a progressive decrease in

the size of the pulp. These age-related pulpal changes diminish tooth sensitivity and pain perception, reduce responsiveness to pulp testing. Saliva plays a critical role in the maintenance of oral health, and diminished output can cause dental caries, oral mucosal infections, sensory disturbances, speech dysfunction, decreased nutritional intake, and difficulty in chewing, swallowing, and denture retention. Due to numerous age- and disease-related changes in the oral and systemic immune systems, older adults are more susceptible to developing opportunistic oral infections. Viral, fungal, lingual varicosities, and bacterial organisms invade, infect, and become latent in the hard and soft tissues of the oropharyngeal region, predisposing the person to disseminated systemic infections. The most common viral infections come from the herpes family ie, herpes simplex virus [HSV] and varicella-zoster virus [VZV].¹¹

Xerostomia is one of the contributing factors to the decrease in sensitivity of the taste buds, increase in dental caries, inability to wear dentures, and burning sensation in the mouth of many elderly. Dysphagia, difficulty in eating or drinking, appears to increase with age ,degeneration of the elastic and collagen fibers and the lip height decreases and intercommissural distance increases with ageing.⁹

Common dental problems

- 1) Increased caries because of increased intake of carbohydrate rich soft cariogenic diet as a result of missing teeth and increased sugar intake as a result of xerostomia and loss of taste
- 2) Increased gingival recession resulting in increased incidence of root sensitivity that is hard to control .Increased incidence of root caries which is difficult to restore in the interproximal regions resulting in restoration failure and continued decay
- 3) Tooth wear: - Attrition, Abrasion, Erosion
- 4) Increased susceptibility to cracks, cuspal fracture, craze lines, Loss of resiliency and decrease in the organic component
- 5) Temporomandibular dysfunction and decreased vertical dimension occurs because of compensating bite due to loss of teeth .³

INTERACTION BETWEEN SYSTEMIC DISEASE AND ORAL DISEASE

Oral health has a critical impact on the functional,

psychological, and economic aspects of the overall quality of life. The oral cavity is a portal of entry for microbial infections. Age-related disorders themselves contribute to higher risks for oral condition in the elderly. Diabetes is a risk factor for advanced periodontal disease and Candida infection. Patients who suffer from cognitive deficits of Alzheimer's disease or other dementias lose the ability to perform proper oral hygiene.⁸

Periodontitis may be a risk factor for significant systemic diseases studies have shown that pathogens associated with periodontitis, including *P. gingivalis*, *Eikenella corrodens*, *Prevotella intermedia*, and *Streptococcus sanguis*, share the ability to invade human coronary endothelial cells. Such micro-organisms may influence atherosclerotic plaque morphology, predisposing to plaque disruption and triggering an acute coronary syndrome or ischemic stroke. Subjects with diabetes mellitus are at greater risk for destructive periodontal disease. Changes in alveolar bone height have been associated with systemic changes in bone tissues and osteoporosis in postmenopausal women.

A decline in immune responses occurs with aging. Immune characteristic changes in older subjects are complex, encompassing an increase in serum immunoglobulin levels, a switch from naive to memory T lymphocytes, an increase in serum natural killer cells, and an increase in interleukin (IL)-1, IL-6, and tumor necrosis factor- α .^{12,13}

The 10 most common systemic diseases seen in functionally independent older adults in the developed world are arthritis, cancer, chronic obstructive pulmonary disease, diabetes, heart disease, hypertension, mental health conditions, osteoporosis, Parkinson disease and stroke. Patients with rheumatoid arthritis (RA) may experience restricted manual dexterity, which may compromise their ability to maintain adequate oral hygiene.¹⁴

There are two mechanisms through which infection and inflammation apparently located in periodontal pockets may harm general health, the passage of periodontal pathogens and their products into circulation (bacteraemia), and the passage of locally produced inflammatory mediators into circulation. Both mechanisms can contribute to inflammatory systemic diseases.¹⁵

Aspiration pneumonia is an important cause of mortality and morbidity in persons of age 60 and above. The leading cause of death among nursing home patients and the second most common cause for hospitalization in this population is nursing home acquired pneumonia, caused by gram negative bacilli. The oral cavity has long been suspected to be a source of organisms responsible for aspiration pneumonia and diseased oral cavity would be a particularly likely source of pathogens. Several prominent periodontal pathogens (including *Bacteroides* and *Fusobacterium* species) among “anaerobic bacteria that are most important as causes” of aspiration pneumonia. Conditions of poor oral hygiene, plaque accretion and compromised host defence that accompany periodontal breakdown provide conditions favorable for proliferation and subsequent aspiration of orally incubated pulmonary pathogens.^{16,17}

Changes in alveolar bone height are associated with systemic changes in bone tissues and osteoporosis in postmenopausal women. Systemic osteopenia or osteoporosis is a degenerative disease that primarily affects post-menopausal women and also sometimes older men. It is characterized by decreased bone density, resulting in hip fracture. The diagnosis of osteopenia and osteoporosis is made using bone density measurements. Several factors have been associated with osteoporosis including female gender, age, ethnicity, diet, and lifestyle. Osteoporotic fractures also tend to have increased resorption and thinning of the mandibular lower cortex and this is correlated with bone mass changes. Oral osteopenia (bone loss of the jaws) may therefore be a component of systemic osteopenia and osteoporosis.¹³

The association of periodontal infections and diabetes mellitus is bidirectional. It's a strong risk factor for bone loss caused by periodontitis. It is suggested that the potential interactions between diabetes and periodontitis seem to enhance the morbidity of these two diseases. Various oral conditions are associated with diabetes such as dry mouth, candidal infections, and delayed wound healing and periodontal disease. Periodontitis has been described as the sixth complication of diabetes, together with retinopathy, nephropathy, neuropathy, macrovascular disease and altered wound healing. Poorly controlled diabetes is also

associated with periodontal diseases. Severe periodontitis in people with diabetes increases the risk of poor glycaemic control due to release of pro-inflammatory cytokines.

The chronic hyperglycemic condition of diabetes is associated with damage, dysfunction, or failure of various organs and tissues, including the periodontium, due to the increased risk for infections in patients with diabetes, impairment of the synthesis of collagen and glycosaminoglycans by gingival fibroblasts, and increased crevicular fluid collagenolytic activity.^{13,18,19}

An association between periodontitis and cardiovascular diseases has been demonstrated. The shared etiology may be found in commonality of pathogens involved in periodontitis and cardiovascular diseases. Pathogens associated with *P. gingivalis*, *Eikenella corrodens*, *Prevotella intermedia* and *Streptococcus sanguis* share the ability to invade human coronary endothelial cells. Periodontal infections are associated with systemic inflammation characterized by an increased burden of periodontal pathogens, antigens, endotoxins and liberation of pro inflammatory cytokines, which may contribute to atherogenesis and thromboembolic events culminating in ischaemic stroke.^{13,14,19}

Dental plaque may act as a reservoir for respiratory pathogens such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *P. gingivalis*, *A. actinomycetemcomitans* and enteric species, and thus be an important risk factor for various respiratory infections. Enzymes released from oral bacteria may act on the respiratory mucosal surface promoting adhesion and colonization of respiratory pathogens. Patients on ventilators are at higher risk for acquiring fatal pneumonia due to periodontal infections, and poor periodontal health in the elderly may be associated with increased mortality from pneumonia. Bacteria from oral biofilms may be aspirated into the respiratory tract to initiate and cause progression of conditions such as aspiration pneumonia, chronic obstructive pulmonary disease (COPD) and lower respiratory tract infections.^{12,13}

Dental caries has become a significant oral health problem for older adults. It can affect both the root and the coronal part of the tooth and is clinically defined as a lesion that extends beyond

the surface of enamel or cementum Australia revealed that chronic use of anti-asthma and beta-blocking medications was related to an increase in coronal caries. Root caries was not affected. Although some relationships between caries and general health exist, additional research is needed better to characterize the associations and relationships.²¹

GERIATRIC ORAL CARE

Maintenance of good oral health should be given priority. People should be educated on the importance of good oral health and the risks associated with poor oral health. Periodontal disease is possibly an important risk factor for various systemic diseases. Dental caries decreases with old age except cemental root caries which is due to the recession of the gums. Root caries is mostly observed in premolars and molars. Periodontal disease is mainly the problem of elderly patients.

Secondary caries is also the more often problem of aged persons. Dentists and medical practitioners should work together to provide comprehensive healthcare, thereby reducing the morbidity and mortality associated with periodontal infections. From the dental perspective, it is important to develop skills in the risk assessment of older patients. Such risk assessment of older subjects should take an approach that is holistic and focused on the reduction of the infectious burden and the improvement of self-efficacy.

Independent of the age of the patient, the treatment provided must be beneficial and cause no or minimal harm to the patient. It is therefore important that the planning of the treatment be preceded by a careful analysis of factors that may influence the outcome and prognosis of therapy. The re-evaluation performed after cause-related dental therapy will determine the need for further treatment.

Geriatric patients are generally classified into three groups based on functional living ability; functionally independent, frail, and functionally dependent. Special approaches and treatment goals for oral health are different for each group. Regardless of functional status, the elimination of acute dental infection and pain should be achieved for all elderly patients. Oral disease

prevention is still the central focus for the elderly population as for other patient populations. Special oral hygiene measures, however, are required for the elderly. One-third of physician consultations resulted in an alteration in dental treatment plans and 8% of consultations led to commencing medical treatment.^{3,4,8}

CONCLUSION

The elderly population is increasing in industrialized societies worldwide. With the decline of caries and periodontal diseases in the younger age groups, dental professionals will be expected to take care of more elderly dentate patients. The management of the elderly population differs from that of the general population because of age-related physiological changes, the presence of age-related conditions/diseases, increased incidence of physical and mental disabilities, and also social and economic concerns. To manage the health care needs of the elderly, coordination between medical and dental care providers will become necessary. From the dental perspective, it is important to develop skills in the risk assessment of older patients. Such risk assessment of older subjects should take an approach that is holistic and focused on the reduction of the infectious burden and the improvement of self-efficacy. Many treatment modalities for geriatric patients are still experimental. Further studies in geriatric dentistry both at the clinical and basic science level are necessary.

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