

## Geriatric dentistry related to prosthetic

**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. Oral health reflects overall wellbeing for the elderly population.

**Dental geriatrics:** 1. the branch of dental care involving problems peculiar to advanced age and aging; 2. Dentistry for the aged patient

**Growth:** - Growth is increase in size.

**Development:** Development is progress towards maturity.

**Maturation:** The stabilization of the adult stage brought about by the growth and development.

**Aging:** Refers to irreversible and inevitable changes occurs with time. It is also defined as the sum of all morphologic & functional alterations that occur in an organism and lead to functional impairment which decline the ability to survive stress.

**Gerontology:** Is the study of aging in all its aspects biologic, physiologic, sociologic & psychologic.

**Gerodontics:** the treatment of dental problems of aging persons; also spelled gerodontics.

**Gerodontology:** the study of the dentition and dental problems in aged or aging persons.

**What causing Aging?** The consensus today is that aging is the end result of multiple biological processes which includes:

**Genetic level:** Where information for the initiation & maintenance of cellular functions are encoded.

**Cellular level:** Where integrity of somatic cells is maintained.

**Organ & Organ system level:** Where physiologic functions are performed.

**Coordination level:** Physiologic functions are controlled & assembled into complex function.

**Factors influencing Aging:****A) Genetic:**

**1- Mutation:** Several mutations reduce life span.

**2. Species specific life span:** Each species is characterized by its own pattern of aging & maximum life span

**3. Hybrid vigor:** The effect of genetic constitution on longevity is perhaps best exemplified where hybrid vigor is demonstrated

**4. Sex:** In humans\animals, female lives longer.

**5. Parental age:** Like father like son.

**6. Premature aging syndrome:** Single gene changes results in premature senescence in humans e.g. progeria, cockayne's syndrome, werner's syndrome ( rapid premature aging).

**B) Environmental:**

**1. Physical and chemical:** Pollution, radiations, working atmosphere etc.

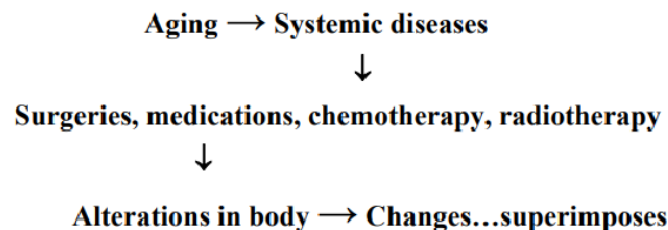
**2. Biological factors:** Nutrition, general health etc.

**3. Pathogens and Parasites:** They influence the rate of human development related to low income group \ tropical countries.

**4. Socioeconomic conditions:** Bad housing, stresses etc.

**Aging Vs others**

- It has always been difficult for researchers to differentiate whether the changes in tissues/organ system are due to physiologic aging or pathologic.
- There is no precise method for determining the rate or degree of aging because:



**Goal of Geriatric dentistry:**

1. To maintain oral health of individuals.
2. To maintain ideal health and function of masticatory system by preventive measures.
3. In diseased patients maintaining oral and general health.

**Objectives of Geriatric dentistry:**

1. To recognize and relieve difficulties of elderly people.
2. Restoration and preservation of function for maintaining normal life in elderly patients.

**Psychological disorders of elderly patients generally seen by prosthodontist:**

**Anxiety:** It is a response to the perception of danger, actual or anticipated. Its purpose is to alert individuals to danger, so as to prepare them to cope with it. A major source of anxiety is alteration of body integrity and the way the body functions. Extensive changes in oral cavity (loss of teeth and replacement with denture) represent such a threat and can trigger anxiety.

**Depression:** It is a response to loss, actual or threatened, real or fantasized. Sadness and hopelessness are the common feelings when significant loss is experienced, such as loss of loved one or loss of a body part. The impact is particularly serious when it is involved emotionally on the invested parts of the body such as face (teeth). For some patients, the teeth have become so invested with meaning that their loss is experienced as catastrophic.

**Conversion Hysteria:** This means, people convert the anxiety from emotional conflicts into somatic symptoms such as pain, muscle weakness, or sensory disturbance, or they reproduce a symptom which they had at some time in the past.

**Body image disturbance:** The mouth is the most emotionally charged area of the body and therefore, frequently involved in body image disturbance. Any alteration to the patient's mouth is a body change to which they must adapt; until they do anxiety will be present.

**Factors that influence the patient's response:**

**1. Parental influences:** The parental attitude toward body values is assumed by the children and this is obviously true regarding the value and appearance of the mouth. Patients who, as children, observe their parents undergoing dental treatment may become traumatically, conditioned by such observations.

**2. Sibling's influence:** The behavior of siblings also has a strong influence on the dental attitude developed by patients.

**3. Peer group:** A person is influenced to some extent by his peer group.

**4. Symbolic significance:** The more common symbolic significance of tooth loss is aging, loss of femininity, loss of virility, loss of attractiveness and vitality and body degeneration.

**5. Current life circumstances:** Where one's life is already seriously disrupted, additional traumas such as tooth loss may impair the ability to cope and increase the probability of a maladaptive response.

*\* Seven basic personality traits will be considered in the light of their influence on success in dentistry. Maximum benefits will be obtained only by those who make an honest attempt to search for personal shortcomings, because of general failing to underestimate grossly personal weakness.*

**Be agreeable:** A group of postgraduate students was asked by Cranes to select the dentist they considered best of those they had visited and write down the reasons for their choice. First on the list, when their answers had been tabulated was. "He was cheerful, friendly, and congenial." Courtesy, politeness, and accommodation cost not one cent, yet they may be sold. Some of the most successful dentists keep a card index system under which is listed personal information about each patient and his family. By the dentist's being conversant with affairs that are of personal interest, each patient is made to feel that he occupies a position of special importance in the practice. The dentist who can make patients "feel at home" in his office will never be worried about future dental practice.

**Be a good listener:** "A bore is the fellow who keeps talking about himself when I want to talk about myself." Cultivate the habit of listening, not merely remaining silent while another speaks, but giving others their undivided attention. Too many people are so concerned about what they are going to say as soon as an opening presents itself that they do not really listen. listening is an art. Some individuals, without uttering a word, can be more flattering than most people. If patients are encouraged to "think out loud" it gives the dentist an opportunity to size up each individual, to learn something of his likes, dislikes, prejudices, and to plan a presentation accordingly. If the dentist wants to enjoy maximum success he must, of course, be a good conversationalist and an enthusiastic educator, but, first of all, he should be a good listener.

**Avoid arguments:** It must be remembered that force never won a permanent victory on the battlefield, and verbal force, which is just another way of describing arguing; there are times when one must fight for principles. One can convince few men and certainly no woman by arguing. Crane' says, "Guide me deftly to the decision you want me to make--don't crowd, don't shove, just feed me ideas as fast as I can absorb them. If you can influence me to persuade myself, I will sign."

**Criticize tactfully:** In general, it can be said that criticism is futile because it aims a death blow at one's self-respect by undermining the feeling of personal worth. Criticism places people on the defense; it makes them appear foolish and silly. It usually opens up deep wounds that never heal, but fester down through the years. Yet it is possible to criticize and accomplish the proper results without offending. It merely requires a little tact. Hence an excellent policy to follow: compliment first, and then tactfully offer constructive criticism.

**Don't be egotistic:** Individuals simply cannot wait for others to discover their good qualities; they extol their own virtues at every opportunity and, in so doing, arouse a feeling of antagonism among those with whom they come in contact. It is important to wait for the others appreciate the effective dental service that you provide.

**Remember name and faces:** We can give people nourishment for their self-esteem by making it a point to remember their name. Anyone, who wishes, can improve his memory simply by listening attentively and concentrating on the name at the time of the introduction. Safer method is to place names of patients and their children on a card together with any other information deemed worthwhile.

**Be interested in others:** Dentists in general become more interested in things than in people. The habit of being interested in others find that, without making any conscious, effort, without realizing exactly why, they hold in their hands the key, the open sesame to the hearts and minds of people.



**Systemic diseases and its dental relation**

**Cardiovascular diseases (CVD)** and periodontitis has interrelationship because of common bacteria associated with its pathogenesis. Periodontal inflammation leads to bacteremia caused by common oral pathogens like Porphyromonas Gingivalis. This microorganism has been isolated from CVD like coronary and carotid atheromas. Therefore, CVD and Periodontitis are interrelated and commonly seen in geriatric patients.

**Infective endocarditis**, other common disease found in elderly patients has association with periodontitis. The bacteria like viridians streptococci normally found in oral cavity, whereas the bacteria found in dental plaque like Actinobacillus actinomycetemcomitans, Eikenella Corrodens, Fusobacterium Nucleatum and Bacteriodes Forsythus have been isolated from the blood sample of Infective endocarditis patients.

**Respiratory infections** are usually caused by oropharyngeal and periodontal microorganism and bacteria. The main cause of respiratory infections and bacterial pneumonia in adults is aspiration of oropharyngeal bacteria. This micro flora habitats in inadequate oral hygiene resulting in formation of dental plaque further serving as a reservoir for respiratory pathogens.

The other common disease **Rheumatoid arthritis (RA)** is seen in elderly patients. This RA has similar characteristic of periodontitis as there is destruction of hard and soft tissues as a result of inflammatory response. However, the interrelationship as well as association between RA and periodontitis has not been proved.

**Diabetes Mellitus (DM):** the other most common disease seen adult and elderly individuals in 21st century. It has been proved and found that the patients suffering from Type 1 and Type 2 DM have distinguished dental manifestations such as loss of periodontal attachment, gingival and periodontal abscess and early loss of teeth.

**Effect of Aging on Oral Tissues (Gerontology of the Oral Cavity)**

- ✓ Losses of tooth support structures (periodontium)
- ✓ Increased loss of epithelium attachment
- ✓ Loss alveolar bone in the elderly
- ✓ Temporomandibular joint
- ✓ Orofacial/mastication muscles, oropharyngeal mucosa, and oral sensory/motor nerve systems.
- ✓ Salivary gland function, taste, tactile sensation and Swallowing

Often there is no clear demarcation between normal physiological aging and pathological diseases. However, there may be some specific changes in individual tissues during aging, e.g.,

-Losses of tooth translucency and surface details

-Abrasion, attrition, and erosion of teeth usually increase with advancing age.

-The dental pulp becomes smaller.

**Geriatric Dentistry differs from traditional general practice in the following aspects:**

- ◆ It is concerned with aging patients, 86% of whom have at least one chronic disorder. (Nursing home residents may have as many as 25 concurrent disorders).
- ◆ Cognitive Dysfunction such as dementia affects compliance and oral health.
- ◆ Use of Polypharmacy causes xerostomia. (over 1000 medications cause dry mouth)
- ◆ Many elderlies have physical disabilities such as vision, hearing and taste disorders.
- ◆ Requires exceptional skill in history taking.
- ◆ Challenges the dentist's ability to design treatment plan and differentiate normal aging from pathologic aging.

**Pathological oral conditions in the elderly:**

- Conditions affecting the periodontium & tooth structure.
- Ulcerative lesions.
- Denture related condition
- Xerostomia (dry mouth)
- Tongue Conditions
- White lesions
- Malignant lesions
- Vesiculo-bullous lesions
- Pigmented lesions

**1. Effect of aging on salivary glands and saliva:**

There are 3 major paired & several minor salivary glands present in oral cavity.

Major glands are:-parotid, sublingual, submandibular.

Minor glands are:-labial, buccal, palatal.

Primary function-exocrine production of saliva.

**Major roles of saliva in maintenance of oral health**

- ✓ Preparation & translocation of food bolus.
- ✓ Lubrication of oral mucosa.
- ✓ Preservation of microbial balance.
- ✓ Mechanical cleansing.
- ✓ Antibacterial & antifungal activities.
- ✓ Maintenance of oral ph.
- ✓ Remineralization of dentition.
- ✓ Mediation of taste activity.



### Salivary function during aging

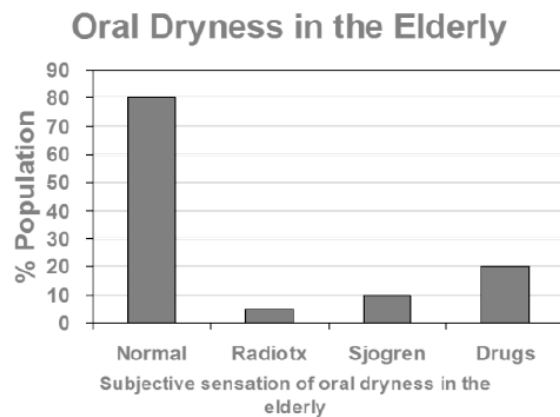
There occurs a fairly linear loss of acinar cells, replaced by fatty or connective tissue.

- Submandibular gland – 40% loss of acinar cells.
- Parotid gland - 30% loss of acinar cells.
- Minor labial glands - 45% loss of acinar cells.

### Morphometric studies show:

- Proportion of gland parenchyma occupied by acinar cells is reduced by 25% - 30%.
- Atrophy of acinar cells.
- Proliferation of ductal elements.
- Some degenerative changes.

Earlier, it was thought that salivary secretion is also reduced with age but recent functional studies showed, despite the appearance of age related morph metric changes in salivary glands - Functional output & composition of saliva doesn't appear to be consistently altered in older but otherwise healthy persons. The decrease in salivary production is more related to salivary gland dysfunction & related oral morbidities associated with systemic diseases & medications.



**2. Effect of aging on oral mucosal barrier:** The oral mucosa performs essential protective function that profoundly affect the general health & wellbeing of host.

- It provides first line of defenses.
- Specialized mucosal sensory detectors serve to warn us of many potentially harmful situations such as spoiled food stuffs, temperature extremes, sharp objects, etc.
- Any changes in O.M. barrier could expose the aging host to myriads of pathogens & chemicals that enter the oral cavity
- Both histologic layers of oral mucosa, epithelium, & connective tissue have important defensive functions.
- Stratified squamous epithelium containing attached epithelial cells forms physical barrier which restricts entry of microorganisms & toxic substances.
- Mucosal epithelial cells synthesize keratin & laminin Preserve structural integrity & restore wound healing.

*Keratin (masticatory mucosa)*: Protect against abrasive insults e.g. stiff foods. But literature doesn't give clear picture of histologic status of O.M. with normal aging. Reports say thinning of epithelium while others contradict.

#### **Oral Mucosa with aging:**

- ✓ Epithelium thinner, more fragile, less keratinized
- ✓ Loss of collagen and elastin from fibers also weaken mucosa
- ✓ Increase in pathological change - loss of tongue papillae and taste buds
- ✓ minor salivary glands diminish
- ✓ Lesions more common and slower to heal
- ✓ Inflammations, irritation and infections

### **3. Effects of aging on periodontium**

#### **A) Gingival epithelium:**

- Thinning & decreased keratinization of the gingival epithelium
- Flattening of rete pegs, altered density.
- Migration of functional epithelium from its position in healthy individual (on enamel) to more apical position on the root surface with accompanying gingival recession

**B) Periodontal ligament:** A fibrous connective tissue is noticeably cellular & vascular.

It's functions are:

- ✓ Attachment & Support
- ✓ Nutrition
- ✓ Proprioception
- ✓ Synthesis

### Periodontal Disease:

#### *Etiology:*

- ✓ Gram positive and negative bacteria
- ✓ Exacerbated in the elderly by diminished motor dexterity (Arthritis, Stroke) and poor hygiene
- ✓ Wide spectrum range of gingivitis, inflammation of sulcular epithelium, recession to periodontal pocketing

#### *Treatment:*

- ✓ Antimicrobial therapy (chlorhexidine 0.12% mouth wash, tetracycline impregnated sulcular fibers, metronidazole 500mg qid or clindamycin 300 mg qid for 10 days).
- ✓ Surgical elimination of pockets.

### C) Cementum:

- ◆ Cementum continuous be laid throughout life but rate of formation diminishes with age
- ◆ A thickening of cementum is observed on teeth that are not in function (hypercementosis).
- ◆ In cemental width(5-10 times) as cementum deposition is continues after tooth eruption.
- ◆ In width is greater apically & lingually

**D) Alveolar bone (in relation to periodontium):** A more irregular PDL surface of bone and less irregular insertion of collagen fibers. Healing of bone in extraction socket appears to be unaffected by aging.

**E) Bacterial plaque:** Dentogingival plaque accumulation increase because increase in hard tissue surface area as a result of gingival recession and the surface characteristic of the exposed root surface for plaque formation compared to enamel.

#### 4. Effect of aging on teeth:

##### *Enamel changes*

##### *Chemically*

- ✓ Increase the levels of N2 & flourine' therefore, increase organic matrix.
- ✓ Enamel near the surface become darker & decay resistant.
- ✓ There is reduced permeability & enamel becomes brittle.

**Attrition:** It may be defined as physiological wear of occlusal or incisal surfaces and proximal contacts as a result of mastication, physiologic tooth movement, functional or para functional movements of mandible.

##### Clinical features

- a) Small polished facets on cusp tips\ridges\slight flattening of incisal edges.
- b) Because of slight mobility of teeth in their sockets & a manifestation of resiliency of pdl, facets also occur at proximal surface.
- c) Decreased cusp height.
- d) Flattening of occlusal plane.
- e) Shortening of length of dental arch.



Attrition

Abrasion

Abfraction

Erosion

##### **Abfraction:**

Recently, it has been proposed that the predominant causative factor of some of the cervical, wedge-shaped defects is a strong (heavy) eccentric occlusal force resulting in microfracture or abfraction ,such microfracture occur as the cervical area of the tooth flexes under such loads.

- This defect is termed as Idiopathic erosion or abfraction.

(All these changes occur more severely in men than women due to greater masticatory force).

*Dentin changes*

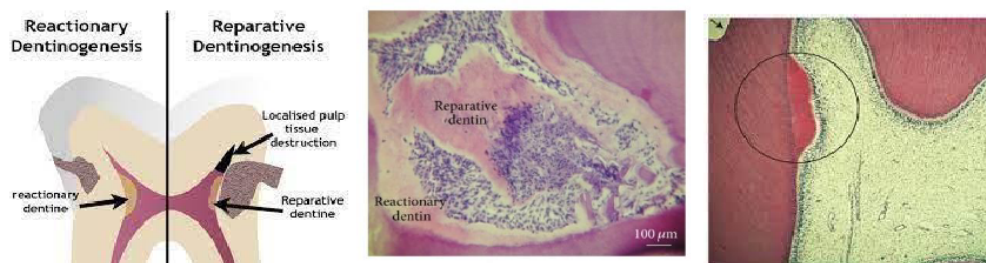
- Vitality of dentin: Since odontoblasts & its processes are integral part of dentin, therefore, there is no doubt that dentin is vital tissue.
- It is laid throughout life though as age progress dentinogenesis slows.

**Aging and functional changes in dentin**

**Reparative\secondary dentin:** If attrition, abrasion, erosion, cavity cutting procedures causes odontoblast processes to cut or exposed, either they die or if they live they form dentin called as reparative dentin.

\* This reparative dentin seals of the zone of injury occurs as a healing process initiated by the pulp resulting in resolution of the inflammation process and removal of dead cells.

\* The reparative dentine has fewer & more twisted tubules.



**Pulp cell changes:** Decrease in number, size & cytoplasmic organelle + Fibroblast changes

**Fibrosis:**

- In aging pulp accumulations of both diffuse fibrillar components as well as bundles of collagen fibers usually appear.
- Fiber bundle arranged: longitudinally ---radicular pulp / diffusely--- coronal pulp.
- Increased in fibers is generalized through out the pulp organ.
- Collagen increases in medial & adventitial layers of blood vessels.
- Increased in collagen fiber is more apparent than actual because of decreased in size of pulp which makes the fibers to occupy less space.
- Vascular changes in aging pulp is same as occur in other organ like plaque calcifications



*Pulp stones /denticles:*

- They are defined as nodular, calcified masses appearing in either or both the coronal or root portion of pulp organ.
- They are seen in otherwise normal tooth in other respects
- They are seen in functional as well as embedded unerupted teeth

*Tooth Loss:*

- \* Not a normal part of aging.

**But** A consequence of oral disease: Caries, Periodontal disease & Often associated with systemic diseases.

Decline in Edentulous Adults, improved and still improving dental health care has led to significant declines in number of edentulous adults with increased retention of teeth into old age, we are seeing more incidences of caries and other dental diseases in those teeth.

**5. Effect of aging on tongue**

- It seems to increase in size in edentulous mouth which may be because of result of transferences of some of the masticatory & phonetic function of the tongue. Enlarged tongue have negative effect on retention of denture.
- There is depapillation which usually begin at apex & lateral border.
- fissuring is also common.
- There is also reduction in the taste buds

**Taste:** Reasons for decline in sense of taste are unclear.

1. Possible decline in number of taste buds
2. Possible decline in density of taste buds
3. Possible decline in sensitivity of taste buds
4. Possible decline in neural processing or retrieval

- \* All of the above also possible.

**Medications Known to Interfere with Taste**

Medications, including the most commonly prescribed, interfere with taste or olfactory senses:

- ✓ Antibiotics: Ampicillin Azithromycin (Zithromax)
- ✓ Ciprofloxacin (Cipro) Clarithromycin (Biaxin)
- ✓ Griseofulvin (Grisactin) Metronidazole (Flagyl)
- ✓ Ofloxacin (Floxin) Tetracycline
- ✓ Anticonvulsants: Carbamazepine (Tegretol)
- ✓ Phenytoin (Dilantin)

**6. Effect of aging on oral motor performance:** (Speech, Mastication, Swallowing)

• Tissues involved are :-upper lip, lower lip , jaws, tongue, floor of oral cavity, soft palate etc.

**a. Speech:**

Speech production is most resistant to aging but that does not mean there are no age-related changes in speech.

• You can very well perceive differences when person of old age speaks but these are largely related to laryngeal rather than oral events.

other speech changes may occur due to:

- Edentulous patient (partial or complete).
- Ill-fitting prosthesis.

**b. Swallowing:**

- Reduced chewing effectiveness.
- Decreased tongue strength: Less muscle and an increase in fatty and connective tissue in the tongue.
- Atrophy of the alveolar bone with lost dentition.
- Increased swallowing time with age.
- Swallowing disorders may be prevalent.

**Swallowing/oral movement in old age:**

- People chew slowly as they get older. Although the duration of the total chewing cycle does not seem to change, it does seem that vertical displacement of mandible is shortened.
- Movements of the mandible are governed by a generator in the brainstem & influenced by the proprioception in the muscles, joints, & mucosa.
- \* Age may impair the central processing of nerve impulses, impede the activity of striated muscles & retard the ability to make decisions.
- ◆ Poor motor coordination & weak muscles.
- ◆ Decrease no of functional motor units, fast muscle fibers & decrease in cross sectional area of masseter & medial pterygoid muscles.
- ◆ Muscle tone decrease by 20-25% which probably explains the shorter chewing stroke & prolonged chewing time if it is there.
- ◆ Some individuals who assumes characteristic stoop of old age experience pain on swallowing because of osteophytes & spurs growing on upper spine adjacent to pharynx.
- ◆ Abnormal mandibular movements consequent to teeth loss, use of complete denture, deflective occlusal contacts.

**c. Mastication:**

Atrophy of masticatory muscles and masticatory ability and performance.

*Masticatory ability:* it is an individual's own assessment of his/her masticatory function.

*Masticatory efficiency:* it is the capacity to grind the food during mastication.

- Essential masticatory function (complete denture wearers) is maintained throughout life.
- Masticatory function depends on the skeletal muscular force and the ability to coordinate oral functional movements during mastication.
- Maximal bite forces decrease in older patients.
- Greater atrophy occurs in complete denture wearers especially women.
- Little evidence that new dentures reduce this atrophy.
- \* Wearing dentures compromise masticatory greatly compared to natural set of teeth.