

Ageing Alterations in Oro-Dental Tissues: A Bird's View

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ABSTRACT

The process of ageing is a normal physiological event which cannot be dimensified. In this review manuscript, various alterations that are evident in the soft and hard tissues of the oral mucosa is highlighted in reason to aging.

INTRODUCTION

Ageing is the process of ongoing internal changes that takes place in the human body over a period of time. Like any tissue in human body, the dental tissues also undergo changes as the aging process advances.¹ Ageing is a natural process in human life, applied to describe the persons who are 65 years and above; involving a diminishing ability to respond effectively. This leads to reduction in function and greater vulnerability to abnormal process.²

Theories of Ageing

As per the literature, there are three common theories to explaining the fundamentality of the process of ageing that includes:^{2 13}

Free radicals Theory: Considered as widely accepted theory that was first postulated by **Harman (1956)**; suggests that free radicals cause oxidative damage to cells and their products, results in direct potentiality in the process of ageing.

Another **theory as proposed by Leo Szilard (1956)** had placed idea that the genes involved in DNA metabolism and repair becomes faulty with time leading to accumulation of damaged DNA that characterized as ageing.

Watson (1972) suggest that the role of Telomeres can be involved in the processing of ageing. Lipofuscin (an intracellular pigment) is seen in many organisms thought to cause ageing. However, various experiments have shown that lipofuscin is rather a product of ageing process than being its cause.

Hard Tissues

Age changes in Enamel^{2 4}

Macroscopic changes

- Enamel is a non-vital tissue that is incapable of regeneration.
- Higher incidence in parafunctional habits leading to loss of tooth structure.
- Reduced translucency; leads to darkened teeth.
- Decreased caries activity because of more mineralization.
- Alterations in the surface layer.

Microscopic changes

- Reduction in the number of enamel rods.
- Disappearance of Perikymatal lines
- Decreased permeability to fluids.

Age changes in Dentin^{1 5}

- Increased deposition of intratubular dentin formation

- Increased acceleration in secondary dentin formation
- Higher prevalence in sclerotic dentin formation (near the root apex).
- Formation of reparative (tertiary) dentin.
- Dead tracts; occurs more often in coronal dentin

Reparative Dentin^{2,4}

- Also called as Tertiary Dentin/ Reparative Dentin.
- Formed in response to an injury or irritant.
- Dentinal tubules get reduced in number, irregular, tortuous.

Dead Tracts^{2,3}

- When the odontoblast has degenerated, the empty dentinal tubules filled with air.
- In ground sections they entrap air, appear as black in transmitted light and white in reflected light.
- Decreased sensitivity in these areas, most probably the initial step in formation of sclerotic dentin.

Sclerotic Dentin^{2,3}

- Described as dentinal tubules that have become occluded with calcified material. When this occurs in several tubules in the same area, the dentin assumes a glassy appearance and becomes translucent.
- Increases with age and most common in the apical third of the root and midway between the DEJ and surface of the pulp.

Age changes in Cementum^{6,7}

- Increased cemental thickness.
- Localized areas by resorption.
- Increased cemental thickness at the apex may obstruct the canal (Hypercementosis).
- Cementum alternatively undergoes resorption and deposition creating reversal lines.
- Reduced permeability to fluid ions.

Hypercementosis^{6,8}

- Excessive production of cellular cementum, which mainly occurs at the apex or apices of the tooth
- Radiographically appear as a radiopaque mass at root apex.
- Results from occlusal trauma and during certain pathologic conditions (such as chronic periapical inflammation), as well as from systemic conditions (Paget disease).
- Clinically extractions will be difficult if adjacent teeth become fused.

Age changes in the Alveolar Bone^{8,1}

- Increased incidence of osteoporosis and reduced mineralized density.
- Fracture healing rate is slower
- Alveolar sockets appear jagged and uneven and the narrow spaces have fatty infiltration.
- Decrease in alveolar process of the jaw
- Increased in size of maxillary sinus due to loss of maxilla
- Distance between the crest of the alveolar bone and the CEJ increase.

Age-Changes in Maxilla & Mandible^{10,8}

- Maxilla resorbs in upward and inward direction
- Mandible downward & outward progressively leading to class-III relation
- Residual ridge resorption are seen
- Incisive foramen becomes closer to the residual ridge

Age changes in TMJ^{10,8}

- Loses its ability to withstand degenerative changes.
- Articular disc may show islands of cartilage and nodules of calcification.
- Alteration in motor function.

SOFT TISSUES

Age changes in Pulp^{2,9,3}

Cellular Changes

- Decrease in size and number of cytoplasmic organelles.

- Intracellular organelles (Mitochondria and Endoplasmic reticulum) are reduced in number and size.
- *Vascular changes*
- Calcifications are seen around the vessel wall near the apical foramen.
- Blood flow decreases with age
- Odontoblast count declines with age
- Pulp stones are commonly found with Dystrophic calcification (central pulp)
- Density of the cell reduces.

Pulp Stones (Denticles)^{3 42}

- Pulp stones (denticles) are nodular, calcified masses appearing in either or both the coronal and root portions of the pulp.
- Pulp stones are classified, according to their structure: True denticles or False denticles

True denticles:

- Are similar to dentin structure as they possess dental tubules and contain odontoblasts process.
- Comparatively rare, usually located close to the apical foramen.

False denticles:

- Do not exhibit dentinal tubules but appear as concentric layers of calcified tissue.
- Pulp stones may also be classified as: Free, Attached, or Embedded, depending on their relation to the dentin.
- Free denticles are entirely surrounded by pulp tissue, whereas the attached denticle are partly fused with the dentin, and embedded denticle are entirely surrounded by dentin.

Diffuse Calcifications

- Appear as irregular calcified deposits in the pulp tissue.
- Can be seen in normal pulp without any signs of inflammation or any pathologic changes.
- Usually found in the root canal and less often in the coronal pulp.
- Diffuse calcification that surrounds blood vessels are termed as Dystrophic calcification.

Age changes in Gingiva^{8 7}

- Thinning and decreased keratinization of gingival epithelium
- Increased width of attached gingiva with increased epithelium permeability to bacterial antigens
- Decrease resistance to trauma
- Reduced stippling and flattening of rete pegs.
- Gingival recession

Age changes in Periodontal Ligament^{4 2}

- Decrease in cellularity and reduction in cell density
- Change in the Extracellular matrix.
- Decrease in the amount of soluble collagen and acid mucopolysaccharides.
- Fiber bundles become thickened and mineralized.
- Scalloping of alveolar bone and the cementum.
- Activity of the pdl tissue decrease because of restricted diet.
- PDL width starts to decrease because of non-functional activity.

Age changes in Alveolar Mucosa^{9 1}

- Thinning of the epithelium with increase in collagen content.
- Decline in cell mediated immunity.
- Nerves and end organs also affected.
- Increase in Fordyce spots in the labial and buccal mucosa.
- Healing ability of oral mucosa is reduced and the duration is increased.

Age Changes in Tongue^{2 3}

- Thinning of the epithelium on the dorsal and ventral surface of the tongue.
- Tongue appears smooth with decline in taste perception due to altered taste fibers.
- Fissure appearance
- Lingual varicosities on the ventral surface of the tongue are seen

Age changes in Palate^{29 1}

- Changes in the dimensions and configuration with changes in surface pattern.
- Loss of concavity
- Flat palate with loss of the teeth and less prominent palatine rugae
- Soft palate becomes smaller in size.

Age changes in Salivary Glands^{2 19}

- Increase in amount of fibrous tissue, fat cells, inflammatory cells.
 - Increase in duct volume.
 - Significant loss of parenchyma leading to reduction in amount of saliva produced
 - Decrease in viscosity of saliva
- a. Ageing may also cause organic changes in the glands where there will be decrease in the number of acini with simultaneous increase in adipose and fibrous tissue.
 - b. Acinar cells become large and eosinophilic; this change is referred to as Oncocytic change.

CONCLUSION

Ageing is a natural process which can neither be accelerated nor can be stopped but the changes can be reduced sufficiently so that person can maintain healthy teeth for life time.

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