Oral Bacteriology

Lecture

Oral microbiota & dental plaque

Dr Mayyadah Hameed Rasheed
BDS, MSc, PhD
Oral Medicine

Ashur University, Dental Technologies Department

Oral Microbiota

Refers to the community of microorganisms that normally live in the oral cavity. These include bacteria, fungi, viruses, and protozoa that exist in balance with the host. It is also called normal oral flora. The warm, moist character of the mouth combined with the relatively open access to the wider environment presents a unique place for microorganisms, the oral cavity contains more than 700 bacterial species, For example: Streptococcus mutans → Major cause of dental caries, Lactobacillus → Associated with deep caries

Natural human microbiota is contributing actively to the well-being and normal development of the host. These microbiota have been shown to:

1. synthesise beneficial compounds vitamin K
2. metabolise potentially harmful compounds such as cholesterol.
3. prevent colonisation by exogenous microorganisms

Oral Microbiota

- ✓ community of microorganisms
- ✓ normally live
- ✓ bacteria, fungi, viruses, and protozoa
- ✓ Balance
- ✓ normal oral flora.
- ✓ warm, moist, open access
- ✓ 700

Oral Microbiota

- ✓ Importance:

1. vitamin K
2. metabolise cholesterol.
3. prevent colonisation

Dental plaque

Dental plaque is defined as a structured, sticky, yellow-grayish biofilm that adheres tenaciously to tooth and other oral structures surfaces.

About 70% of dental plaque is a complex microbial community (bacteria and fungi) embedded in extracellular matrix, this matrix represents 30% of dental plaque.

This extracellular matrix is composed of:

- extracellular polysaccharide (from saliva and bacteria) that adheres tenaciously to tooth and other oral structures surfaces.
- minerals that derived mainly from saliva like calcium and phosphate, these minerals may lead to calculus formation if plaque is not removed
- food debris.

- Stages of Dental Plaque Formation:
- Stage 1: Formation of Acquired Pellicle (Within Minutes) Occurs immediately after tooth cleaning. A thin, acellular film derived from salivary glycoproteins forms on the enamel surface. Acts as a receptor surface for bacterial attachment.
- Stage 2: early Bacterial Colonization (0–24 Hours) mainly Gram-positive cocci, especially Streptococcus species) attach to the pellicle. And then Bacteria begin to multiply.
- Stage 3: Secondary Colonization (1–3 Days)Additional bacteria attach to already attached bacteria (co-aggregation). Increase in bacterial diversity. Formation of small microcolonies.
- Stage 4: Plaque Maturation (3–7 Days), Biofilm becomes thicker. Increase in Gram-negative and anaerobic bacteria. Oxygen levels decrease in deeper layers.
- Stage 5. Mature Plaque (After 7 Days)Highly organized, complex microbial community. Increased production of Acids → leading to dental caries, Toxins and enzymes → leading to gingivitis and periodontal disease, If not removed, may mineralize and form calculus.

Dental plaque

Definition

structured, sticky, yellow-grayish biofilm that adheres tenaciously to tooth and other oral structures surfaces.

- ✓ 70% bacteria and fungi
- ✓ 30% extracellular matrix



Dental plaque

extracellular matrix

- ✓ polysaccharide from saliva and bacteria (adheres)
- ✓ minerals from saliva: Ca, Pb → calculus
- ✓ food debris.

Dental plaque

Stages of Dental Plaque Formation:

Stage 1: Formation of Acquired Pellicle

- ✓ (Within Minutes) immediately after tooth cleaning.
- ✓ A thin, acellular film derived from salivary glycoproteins
- ✓ forms on the enamel surface.
- ✓ Acts as a receptor surface for bacterial attachment.

Stage 3: Secondary Colonization

(1–3 Days)Additional bacteria attach to already attached bacteria (co-aggregation). Increase in bacterial diversity. Formation of small microcolonies.

Dental plaque

Stage 4: Plaque Maturation

- ✓ (3–7 Days)
- ✓ Thicker
- ✓ ↑ G-ve
- ✓ ↑ anaerobic bacteria
- ✓ ↓ O2 in deeper layers.

Dental plaque

Stage 5. Mature Plaque

- ✓ (After 7 Days)
- ✓ Highly organized, complex microbial community.
- ✓ ↑ Acids → dental caries,
- ✓ ↑ Toxins and enzymes → gingivitis and periodontitis
- ✓ If not removed → mineralize → calculus.