Introduction

Bacteria :- Are single – celled , prokaryotic microorganisms, that exist in various environment, including soil, water , air and living organisms. They are classified into gram – positive and gram – negative based on their cell wall structure.

Shapes of bacteria:-

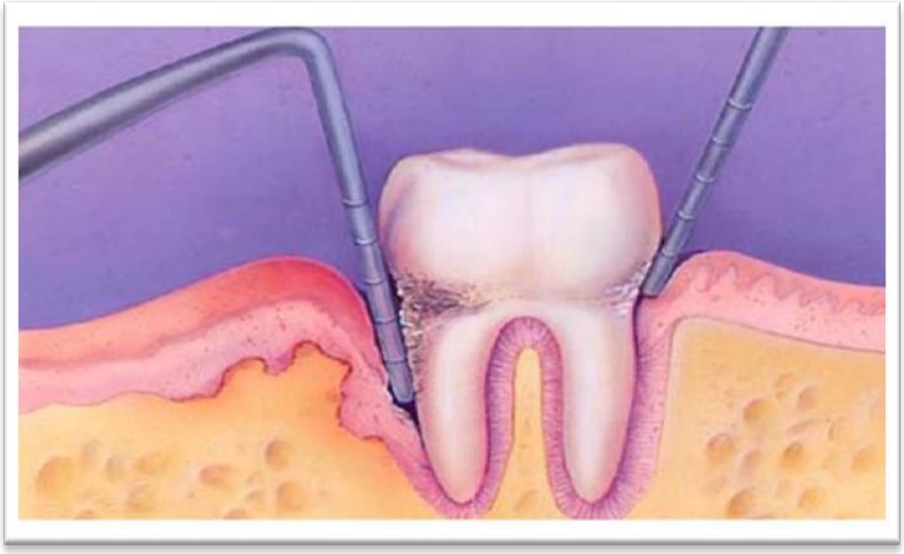
- Cocci :- spherical (e.g., streptococcus)
- Bacilli :- rod shaped (e.g., lactobacillus).
- Spirochetes :- spiral shaped (e.g., treponema).

Introduction of Oral bacteria

The human oral cavity is a complex ecosystem with over 700 species of bacteria. Oral bacteria can exist as free – floating (planktonic) or within biofilms (e.g., dental plaque).

Periodontal diseases can be defined as disorders of supporting structures of the teeth, including the gingivae, periodontal ligament and supporting alveolar bone. Periodontal disease can be broadly categorized into gingivitis (In the earliest stage of periodontal disease , gingivitis ,the infection affects only the gums. While in more sever forms of the disease, all of the supporting tissue are involved) and periodontitis.

Periodontal disease is generally accepted to be an infectious disease. It is a chronic disease characterized by the interaction between Gram- negative bacteria and host inflammatory response, which results in a destructive change that leads to the loss of bone and connective tissue attachment. (peri), means around and (dontal) refers to teeth.



Many oral bacterial species have been suspected to be associated with periodontal disease. To date, a few bacteria, including Bacteroides forsythus, have been considered to be key etiological agents of periodontal disease.

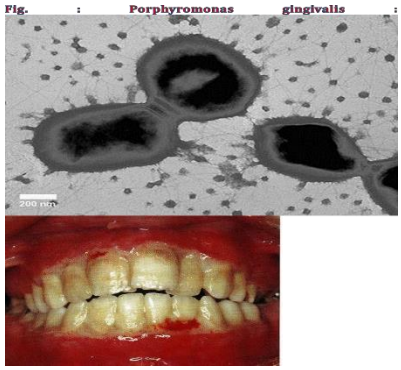
- **The etiology of periodontal disease consider 3 groups of factors:-**

1. A susceptible host
2. The presence of pathogenic species
3. The absence of beneficial bacteria

The main bacteria that cause disease is anaerobic bacteria like; Porphyromonas gingivalis , Bacteriodes forsythus , Actinomycetemcomitans.

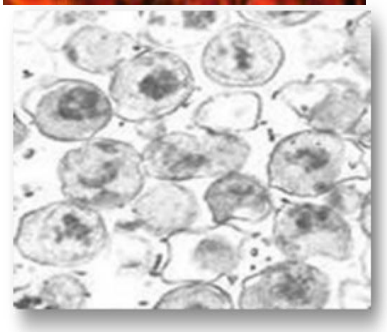
1. Porphyromonas gingivalis

This bacterium is anaerobic , Gram negative rod , it is a black pigmented microorganism , has a carbohydrate capsule on its outer surface which inhibit phagocytosis by neutrophils and has protease (as a virulence factor) , which can effect the periodontium and cause damage to bone and gingiva . It is found in the oral cavity, where it is implicated in periodontal disease, as well as in the upper gastrointestinal tract, the respiratory tract and the colon.



2. Bacteroides forsythus

is a Gram-negative, anaerobic, fusiform bacterium and is considered to be an etiological agent in periodontal disease. Is a non pigmented saccharolytic anaerobic Gram-negative rod , posses several virulence factors including the production of a trypsin-like protease and lipopolysaccharide and its ability to penetrate into host cells or induce apoptosis.



3. Actinobacillus actinomycetemcomitans

A Gram-negative, facultative, non motile coccoid bacillus, non-spore-forming, oval to rod-shaped bacteria occurring as parasites or pathogens.

➢ Symptoms:-

- This disease may progress slowly and at times, even painlessly. Some people do not notice that they have gum disease until it has progressed to periodontitis. The symptoms can be through the gum line or localized in one area. Here are some warning signs to watch out for.

1. Bleeding Gums (after brushing or flossing)
2. Chronic Bad breath (halitosis)
3. Swollen Gums
4. Gum inflammation (red gums)
5. Receding Gums
6. Periodontal pockets
7. Uneven dentures or teeth bite.
8. Loose teeth Pathogenesis

Pathogenesis

- The gingival tissues respond within 2 to 4 days to a beginning accumulation of microbial plaque with acute exudative vasculitis which termed the initial lesion.
- This response, which includes loss of perivascular collagen, is comparable to that elicited in most other tissues subjected to acute injury and may be a consequence of the elaboration and release of chemotactic and antigenic substances by microbial plaque. Within 4 to 10 days, the early lesion develops. It is characterized by a dense

infiltrate of lymphocytes and other mononuclear cells, pathologic alteration of fibroblasts, and continuing loss of the connective tissue substance.

- The early lesion is followed by the established lesion which develops within 2 to 3 weeks and is distinguished by a predominance of plasma cells in the absence of significant bone loss
- The established lesion, which is extremely widespread in humans, may remain stable for years or decades, or it may become converted into a progressive destructive lesion.
- In the advanced lesion, plasma cells continue to predominate although loss of the alveolar bone and periodontal ligament

Periodontitis can be classified into two main groups: chronic and aggressive. The chronic form is by far the most prevalent disease globally Currently recognized key Gram-negative periodontal pathogens include Porphyromonas gingivalis, Bacteroides forsythus, and Actinobacillus actinomycetemcomitans. Periodontal diseases can be treated by plaque control, root surface debridement, periodontal surgery and the prudent use of antimicrobial agents.

Predominant Plaque Bacteria

The main etiological agent of periodontal disease is microflora inhabiting subgingival plaque. However the host tissues and its specific and nonspecific host defense mechanisms play crucial modulating roles (i.e. modifying factors) in the disease process.

1. Host tissue

when plaque accumulates close to the gingival margin, the host defenses are overcome and gingival inflammation (gingivitis) and subsequent periodontal inflammation with loss of attachment ensues (periodontitis).

2. Host defense factors

Both the specific and non-specific immune responses of the host to subgingival plaque are considered to play critical roles in the initiation, progression and recovery from periodontal diseases. One of the most important components of the host response is the GCF, which contains both specific and non - specific defense factors include (Polymorphonuclear leukocytes, T and B lymphocyte , antibody, macrophage , lysozyme, lactoferrin) .

3. Microorganisms in subgingival plaque

That dental plaque biofilm is the essential aetiologic agent of the common forms of chronic gingivitis and periodontitis.

Microbiological studies of periodontal plaque flora

As most of the periodontal plaque flora is anaerobic, special care must be taken to preserve the viability of these organisms.

Prevention:

The following steps can help reduce your risk of developing periodontal disease:

- Stop smoking.
- Eat nutritiously.
- Follow good dental self-care practices.
- Get regular professional dental care.

Mode of transmission

- periodontal disease , may be passed from parents to children and between intimate partners. bacteria present on the oral soft tissue, teeth, tongue and saliva.
- They can be transferred from one person to another through saliva. In addition that periodontal disease has a genetic component .

Home work\\

Do periodontal disease can affect overall health , linking it to conditions like heart disease , diabetes, and pregnancy complications? YES, or NO, Why