



Periodontology- fourth stage



First semester-Etiology of periodontal disease Lec-8

By assistant lecturer: Reham Adnan Radhi
Department of periodontology
College of dentistry
University of Basrah

Content

- **Definition**
- **Risk factor that contributing to the etiology of periodontal diseases.**
 - ✓ **Systemic risk factors**
 - ✓ **Local risk factors**

❖ **Periodontal diseases:** are the most prevalent and multifactorial diseases that involved hard and soft dental tissues, bacterial colonization, and immune responses of the host.

✓ **Two basic forms of periodontal disease**

Gingivitis

periodontitis

Definition

- **Gingivitis:** It is the inflammation of the gingiva in which the junctional epithelium remains attached to the tooth at its original position. Its characterized by areas of redness and swelling and there is a tendency for gingival bleeding.
- **Periodontitis:** It is the inflammation of the supporting tissues of the teeth leading to the permanent destruction of these tissue. Its characterized by clinical attachment loss, periodontal pocking and alveolar bone loss.
- **Risk:** probability that an individual will develop a specific disease in a given period of time.
- **Risk factor:** can be defined as characteristics or factors that when present increases the risk that an individual will get the disease.



- ❑ Gingivitis may progress to periodontitis when it is left untreated and with the presence of other contributing factors beside the original factor (dental plaque)

- ❑ In some individual gingivitis may not progress to periodontitis for long period of time even if it is not treated and this condition is called **contained gingivitis**.

✓ **This is depending on**

1. Host response.
2. Pathogenicity of bacteria.

Risk factors

Systemic risk factors

Modifiable risk factors

Non-modifiable risk factors

Local risk factors

Anatomic risk factors

Iatrogenic risk factors

Systemic risk factors

➤ Modifiable risk factors

■ Dental plaque and oral hygiene

- The primary etiological factor in the development and initiation of periodontal disease is dental plaque.
- Dental calculus which mineralized dental plaque is consider as secondary etiological factor.
- Comprehensive oral hygiene programs are effective in preventing or reducing the level of gingival inflammation.

■ **Specific microorganism**

- Studies show that bacterial species colonizing the gingival pocket play variable roles in the pathogenesis of periodontal diseases, but only small number has been associated with the progression of the disease and considered etiologically important, there are:

1. ***Porphyromonas gingivalis***
2. ***Prevotella intermedia***
3. ***Tannerella forsythia***

■ Tobacco Smoking

- Tobacco smoking is a major risk factor for increasing the prevalence & severity of periodontal destruction. It was found that the increased risk for periodontitis in smoker was 2.5 - 7 times greater than nonsmoker.



A. The physiological effects of smoking on the etiology of periodontal disease

1. The smokers appear have less gingival inflammation and less bleeding in the gingiva due to decreased gingival vascularity, which includes increased vascular density, reduced lumen area of gingival vessels (increased vasoconstriction).

2. Nicotin increases rate of proliferation of gingival epithelium which can contribute to the reduction of inflammatory clinical signs in the gingival tissues.



B. The microbiological effect of smoking

- In the etiology of periodontal disease include increase colonization of shallow periodontal pockets by periodontal pathogens & increase levels of periodontal pathogens in deep periodontal pocket.
- Smoker may have higher level of *Tannerella forsythia*, *P. gingivalis* and *Treponema denticole*.
- It has been found that smoke derived aryl hydrocarbons and bacterial LPS may act additively to inhibit bone formation, which may explain why periodontal bone loss is greater and bone healing is less successful in smokers than non smokers with periodontal infections.



C. The immunological effect of smoking

1. Nicotin causes decrease immune response and impair PMNs chemotaxis and phagocytosis.
2. Increase the production of TNF - alpha, IL - alfa & IL6 These immune mediators are known to lead to more sever destructive inflammation in the periodontal tissue.
3. Reduction in the serum concentration of Immunoglobulin as IgG2 which is essential in the protection against periodontal infection. Also smoking decrease the level of salivary IgA antibodies.

■ Diabetes mellitus

- ✓ It is a complex metabolic disease characterized by chronic hyperglycemia. Uncontrolled diabetes (chronic hyperglycemia) is associated with many problems as:
 - reduction in the defense mechanism (neutrophil dysfunction, Impairment of chemotaxis & phagocytosis),
 - atherosclerosis & reduce normal gingival blood flow,
 - increased Susceptibility to infections including periodontitis
 - poor wound healing.

- ✓ Diabetes mellitus does not cause gingivitis or periodontal pocket, but it alters the response of periodontal tissues to local factor.

- ✓ **Important feature of periodontal disease in diabetic patients**, very severe gingival inflammation, deep periodontal pockets, rapid bone loss & frequent periodontal abscesses.
- ✓ The mechanism responsible for increasing the risk of severe periodontal destruction in uncontrolled diabetic patients unclear, but it is likely to be related to increased susceptibility to infection, an impaired immune response, poor wound healing & increase collagenase activity.

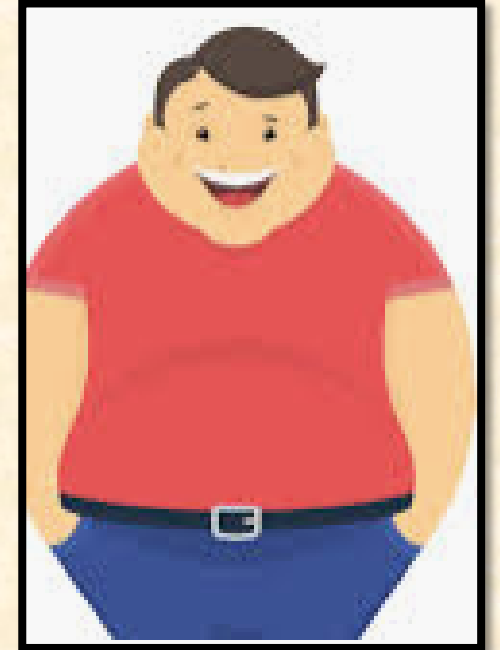


■ Psychosocial stress

- ✓ Stress results from interactions between individuals and their environment. It has been defined as a state of mental or bodily tension resulting from factors that tend to alter an existent equilibrium.
- ✓ studies have demonstrated that individuals under psychological stress are more likely to develop clinical attachment loss and loss of alveolar bone.
- ✓ **One possible link in this regard may be**
 1. increased glucocorticoid secretion that can depress immune function increased insulin resistance.
 2. increases in production of IL-6 in response to increased psychological stress and thus potentially increased risk of periodontitis.
- ✓ **Another study suggests** that host response to P. gingivalis infection may be compromised in psychologically stressed individuals also the relationship is simply due to the fact that individuals under stress are less likely to perform regular good oral hygiene and prophylaxis.

■ Obesity

- ✓ The metabolic syndrome, a clustering of dyslipidemia and insulin resistance may exacerbate periodontitis
- **The reasons that obese subjects tend to exhibit poor periodontal status relative to non - obese individuals include:**
 1. Reduce blood flow to the periodontal tissues, promoting the development of periodontal disease.
 2. obesity may enhance immunological or inflammatory disorders.



■ Socioeconomic status (SES)

- ✓ Gingivitis and poor oral hygiene are clearly related to lower SES, This can be attributed to decreased dental awareness and decreased frequency of dental visits compared with more educated individuals of higher SES.

■ Pregnancy, puberty & menopause (hormonal)

- **Pregnancy associated gingivitis** is inflammation of the gingival tissues associated with pregnancy.
- ✓ This condition is accompanied by increase in steroid hormones in crevicular fluid & increase in levels of (*Prevotella intermedia* microorganism) which use the steroids as growth factors.
- ✓ The increase in sex hormones may exaggerate the inflammatory response to dental plaque which means small amount of plaque may lead to gingivitis.



- **Puberty**

Puberty is also accompanied by an exaggerated response of the gingiva to local irritation. As adulthood is approached, the severity of the gingival inflammation diminishes even when local factors persist.

- **Menopause**

During menopause, estrogen deficiency will reduce bone mineral density. So, some women may develop menopausal gingivostomatitis



Puberty associated gingivitis



menopausal gingivostomatitis

■ Medications

- ✓ Gingival enlargement is a well - known consequence of the administration of some drugs as **anticonvulsants** (Phenytoin or Dilantin), **immunosuppressant** (Cyclosporine) & **Ca channel blockers** (Nifedipine).
- ✓ In general the overgrowth of the gingiva start as painless enlargement of the interdental papilla & extend to the marginal gingiva, then as the condition progresses, the marginal & papillary enlargements unite together & may cover the clinical crown & may interfere with the occlusion.
- ✓ The gingival enlargement may be dose - related which mean if the physician reduce the dose of the drug without affecting the systemic condition of the patient, this may reduce the enlargement or use an alternative medication that does not cause gingival enlargement as a side effect.
- ✓ Other factor that may influence the gingival enlargement is the continuous use the drug for a long period of time (the duration) which may result in recurrence of the lesion even if it is treated surgically.

- ✓ Gingival enlargement occur in **50 - 65%** of patients receiving the phenytoin (Dilantin) drug.
- ✓ Cyclosporine which is immunosuppressive agent used to prevent Organ transplant rejection. The enlargement occurs in **30%** of patients receiving this drug.
- ✓ Calcium channel blockers are drug used for the treatment of cardio - vascular conditions such as hypertension & Angina pectoris. Some of these drugs can induce gingival enlargement.
- ✓ Nifedipine is one of the most commonly used drug that induced the enlargement in about **20%** of the patients. Amlodipine & Verapamil, which also induced gingival enlargement.



➤ Non - modifiable risk factors

■ Hematological Disorders

- ✓ Hemorrhagic gingival overgrowth with or without necrosis is a common early manifestation of acute leukemia. Patients with chronic leukemia may experience similar but less severe periodontal changes. Chemotherapy or therapy associated with bone marrow transplantation may also adversely affect the gingival health.



■ Genetic factors

- ✓ Genetic factors may play an important role in determining the nature of the post response & may affect the function of phagocytic immune cells or the structure of the epithelia or connective tissue.

✓ One of these diseases is **papillon - Lefevre syndrome** which is a rare hereditary disease characterized by hyperkeratotic skin lesion in the palms, soles, knees & elbows & sever destruction to the periodontium with early loss of primary & permanent teeth.



✓ Other disease is **aggressive periodontitis** which has familial aggregation (which means seen in one family). Some immunological defects are associated with aggressive periodontitis.



■ Aging

- Aging is associated with an increased incidence of periodontal disease.
- With aging a number of changes take place in the periodontal tissues:
 - Arteriosclerosis (reduction in arterial blood supply).
 - The gingiva become more fibrotic & less keratinized.
 - The periodontal fiber bundles become thicker with decrease in cellularity.
 - Osteoporosis of alveolar bone.
- Age by itself has no influence on the periodontal tissues, but the older the age, the longer the time interval & the more the chance of periodontal tissues to be exposed to local factor **(accumulative effect of age)**, also there is declined host defense mechanism & high incidence of systemic diseases & drug intake which may adversely affect the periodontal health.

■ Sex

- ✓ Sex Numerous studies reported a higher periodontal destruction among males compared to the female population. The reasons for these sex differences are not clear, but they are thought to be related to the ignorance of oral hygiene, which is usually observed among males.

■ Ethnicity

- ✓ The level of attachment loss is also influenced by race / ethnicity, although the exact role of this factor is not fully understood. Certain racial / ethnic groups, particularly subjects of African and Latin American background, have a higher risk of developing periodontal tissue loss than other groups.

■ HIV \ AIDS

- ✓ It has been stated that the immune dysfunction (immunosuppression) associated with human immunodeficiency virus (HIV) infection & acquired immunodeficiency syndrome (AIDS) increases susceptibility to periodontal disease. Those patients often had severe periodontal destruction characterize necrotizing ulcerative periodontitis.



■ Osteoporosis

- ✓ It has been proposed that low bone mineral density in the maxilla and mandible as a result of osteoporosis may contribute to periodontal pathology by accelerating alveolar bone resorption that is initiated by the periodontal infection.
- ✓ In addition, factors affecting systemic bone remodeling (e.g. heredity, estrogen, vitamin D) may also modify the local tissue response to periodontal infection, increase the release of pro-inflammatory mediators, and lead to enhanced destruction of the periodontal tissues.



Local contributing risk factors to the etiology of periodontal diseases

- ✓ Anatomical factors
- ✓ Iatrogenic factors

A. local anatomic risk factors

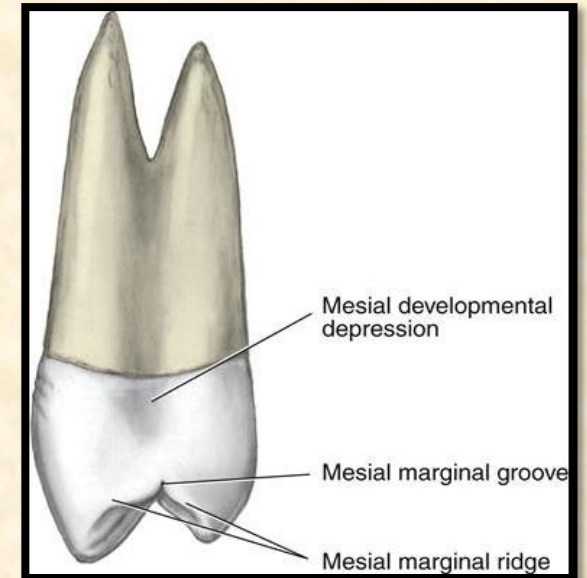
- 1. Furcation anatomy:** The entrance of bifurcations or trifurcation is restricted to limit the access for mechanical root instrumentation. Also the presence of concavities in the furcal aspects of molar roots will limit instrumentation.
- 2. Cervical enamel projections (CEP):** These are tooth developmental deformities of the CEJ found on molars. The enamel is projected toward the entrance of the furcation & this projection may responsible for furcation invasion & localized severe bone loss around the tooth.



3. Palatogingival grooves (PGG): These are tooth developmental deformities of maxillary central & lateral incisors. They begin in lingual pits & extend vertically onto root surfaces & may extend to the root apex & are associated with increased gingival inflammation & plaque accumulation.



4. Root Morphology: The mesial root surface of the maxillary first premolar presents with a pronounced concavity which may not be accessible to oral hygiene procedures or professional instrumentation.



B. Iatrogenic risk factors (faulty dentistry)

1. Overhang margins of proximal restorations.
2. Open or loose contacts of crowns & fillings.
3. Poorly designed or fitted prosthesis ,For example, Lingual bar is better than full coverage to keep the cleansing action of saliva & massage from tongue.

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Thank
you!!