



Review Article

A BRIEF REVIEW ON PERIODONTAL DISEASES

Raja Biswas*, Chetan Kumar Dubey, Surya Pratap Singh, M.P.Khinchi

Department of Pharmacology, Kota College of Pharmacy, Kota, Rajasthan, India.

ABSTRACT

Periodontal disease is a chronic inflammatory disease of the gum and tissues that surround and support the teeth. Periodontal disease is caused by bacteria in dental plaque, the sticky substance that forms on your teeth a couple of hours after you have brushed. Interestingly, it is your body's response to the bacterial infection that causes most of the problems. In an effort to eliminate the bacteria, the cells of your immune system release substances that cause inflammation and destruction of the gums, periodontal ligament or alveolar bone. This leads to swollen, bleeding gums, signs of gingivitis (the earliest stage of periodontal disease), and loosening of the teeth, a sign of severe periodontitis (the advanced stage of disease). The main goal of treatment is to control the infection. The number and types of treatment will vary, depending on the extent of the gum disease.

KEYWORDS: inflammation, bacteria in dental plaque, destruction of the gums, periodontal ligament

INTRODUCTION

Periodontal diseases are the most common dental conditions. Periodontal disease is gum disease. The word “periodontal” means “around the tooth.” Periodontal disease is a chronic inflammatory disease of the gum and tissues that surround and support the teeth. If left untreated, periodontal disease can lead to tooth loss. Gingivitis is gingival inflammation associated with plaque and calculus accumulation. Gingivitis may or may not progress to more advanced forms of the disease known as periodontitis, which is associated with alveolar bone loss and diagnosed by increases in probing depths, loss of clinical attachment, and radiographic evidence of bone loss. Periodontitis is chronic and progressive and there is no known cure. Important periodontal pathogens are actinobacillus actinomycetemcomitans,

Porphyromonas gingivalis, Dialister pneumosintes, Bacteroides forsythus, P. gingivalis and Prevotella intermedia and Treponema denticola. Other gram negative anaerobic rods, some gram positive bacteria and even enteric rods/pseudomonas may also play roles in the etio-pathogenesis of periodontitis. Development of more effective diagnosis and control of periodontal infections and more cost-effective means of managing or curing severe types of periodontitis is urgently needed. Some periodontitis patients lose teeth from periodontal disease. Periodontal disease, however, is treatable and may even be prevented. Risk for periodontal disease and lack of treatment of periodontitis have been linked to the systemic health of the patient. Periodontitis is a complex interaction between an infection and a susceptible host. Periodontal disease is initiated by an infection; however, it appears to behave not like a classic infection but more like an opportunistic infection. As a bio film mediated disease, periodontal disease is inherently difficult to treat.

Corresponding author

Raja biswas*

Kota College of Pharmacy, Kota, Rajasthan

E mail: rajbiswas198@gmail.com

Mobile-7877649173



Fig.1: Example of Periodontitis

Symptoms

Symptoms of gum disease include:

- Bad breath that won't go away
- Red or swollen gums
- Tender or bleeding gums
- Painful chewing
- Loose teeth
- Sensitive teeth
- Receding gums or longer appearing teeth
- Any of these symptoms may be a sign of a serious problem, which should be checked by a dentist. At your dental visit the dentist or hygienist should:
 - Ask about your medical history to identify underlying conditions or risk factors (such as smoking) that may contribute to gum disease.
 - Examine your gums and note any signs of inflammation.
 - Use a tiny ruler called a "probe" to check for and measure any pockets. In a healthy mouth, the depth of these pockets is usually between 1 and 3 millimeters. This test for pocket depth is usually painless.

The Periodontium

The periodontium is the part of the mouth that consists of the gum and supporting structures. It is made up of the following parts:

- Gum (gingiva). When healthy, the gingiva is pale pink, firm, and does not move. It has a smooth or speckled texture. The gingival tissue between teeth is shaped like a wedge.
- The space between the gum and tooth, called the sulcus. The sulcus is the main place where periodontal problems begin.
- Root surface of the teeth (the cementum)
- Connective tissue
- Alveolar bone. The alveolar bone contains the teeth sockets and supports the teeth.

RISK FACTOR OF PERIODONTITIS

When gingivitis is not treated, it can advance to "periodontitis" (which means "inflammation around the tooth.") In periodontitis, gums pull away from the teeth and form "pockets" that are infected. The body's immune system fights the bacteria as the plaque spreads and grows below the gum line. Bacterial toxins and the body's enzymes fighting the infection actually start to break down the bone and connective tissue that hold teeth in place. If not treated, the bones, gums, and connective tissue that support the teeth are destroyed. The teeth may eventually become loose and have to be removed.

Risk assessment for periodontitis

- Heredity as determined by genetic testing and family history
- Smoking including frequency, current use, and history

- Hormonal variations such as those seen in
- Pregnancy in which there are increased levels of estradiol and progesterone that may change the environment and permit the virulent organisms to become more destructive.

Systemic diseases such as

- Diabetes (the duration and level of control are important)
- Osteoporosis

- Immune system disorders such as HIV

Nutritional deficiencies that may require a dietary analysis

Medications such as

- Calcium channel blockers
- Immunomodulatory agents
- Anticonvulsants
 - Faulty dentistry such as overhangs and subgingival margins
 - excessive occlusal loads
 - Poor oral hygiene resulting in excessive plaque and calculus
 - History of periodontal disease
 - Additional risk factors including hyperlipidemia and possibly Arthritis

Risk Reduction Strategies

- More frequent visits for those with a genetic predisposition and the use of perioceutics (use of pharmacotherapeutics for the management of periodontitis)
- Smoking cessation using one or more of the six approved regimens; these regimens rarely are successful as sole therapies (multiple forms of therapy often are used in combination with counseling to achieve success)
- Stress management; possible referral to a psychologist or psychiatrist
- Nutritional supplementation; possible referral to a nutritionist
- Medications can be changed in consultation with the physician
- Corrective dentistry
- Occlusal adjustments

Miscellaneous Risk Factors

Smoking Need another reason to quit smoking? Smoking is one of the most

significant risk factors associated with the development of periodontitis.

Hormonal changes in girls/women these changes can make gums more sensitive and make it easier for gingivitis to develop.

Diabetes People with diabetes are at higher risk for developing infections, including periodontal disease.

Stress Research shows that stress can make it more difficult for our bodies to fight infection, including periodontal disease.

COMPLICATION WITH OTHER DISEASE

The Relationship between Oral Health and Diabetes Mellitus

The term “diabetes mellitus” is used to identify a group of disorders characterized by elevated levels of glucose in the blood. This elevation is the result of a deficiency in insulin secretion or an increased cellular resistance to the actions of insulin, leading to a variety of metabolic abnormalities involving carbohydrates, fats and proteins.

Oral Manifestations of Diabetes Mellitus

A number of oral disorders have been associated with diabetes mellitus. The association of diabetes mellitus and periodontal diseases (such as gingivitis and periodontitis) has received the greatest attention and is the focus of this article.

Dental caries

The occurrence of dental caries in patients with diabetes mellitus has been studied, but no specific association has been identified.³ The relationship between dental caries and diabetes mellitus is complex.

Salivary dysfunction

Dry mouth, or xerostomia, has been reported in people with diabetes mellitus.⁴ Salivary dysfunction, however, can be difficult to diagnose.

Oral mucosal diseases and other oral infections

A number of types of oral mucosal lesions, including lichen planus and recurrent aphthous stomatitis, have been reported in people with diabetes mellitus. Not all study results have showed this association, and these are relatively common disorders that often are observed in patients who do not have diabetes.

Taste and other neurosensory disorders

Taste disturbances have been reported in patients with diabetes mellitus,³ but all investigators have not observed this finding. Although patients with diabetes who receive hemodialysis have been reported to have altered taste,⁷ it is a complex symptom, and it may be related to salivary flow and changes in food intake associated with disease management.

Gingivitis and periodontitis

In contrast to other reported oral manifestations of diabetes mellitus,

periodontal disease is a recognized and well-documented complication of diabetes.

TREATMENT

The main goal of treatment is to control the infection. The number and types of treatment will vary, depending on the extent of the gum disease. Any type of treatment requires that the patient keep up good daily care at home. Additionally, modifying certain behaviors, such as quitting tobacco use, might also be suggested as a way to improve treatment outcome.

Deep Cleaning (Scaling and Root Planing)

The dentist, periodontist or dental hygienist removes the plaque through a deep-cleaning method called scaling and root planing.

Medications

Medications may be used with treatment that includes scaling and root planing, but they cannot always take the place of surgery. Depending on the severity of gum disease, the dentist or periodontist may still suggest surgical treatment.

Table.1: Medication used treatment

	What is it?	Why is it used?	How is it used?
Prescription antimicrobial mouthrinse	A prescription mouthrinse containing an antimicrobial called chlorhexidine	To control bacteria when treating gingivitis and after gum surgery	It's used like a regular mouthwash
Antiseptic "chip"	A tiny piece of gelatin filled with the medicine chlorhexidine	To control bacteria and reduce the size of periodontal pockets	After root planing, it's placed in the pockets where the medicine is slowly released over time.
Antibiotic gel	A gel that contains the antibiotic doxycycline	To control bacteria and reduce the size of periodontal pockets	The periodontist puts it in the pockets after scaling and root planing. The antibiotic is released slowly over a period of about seven days.
Antibiotic micro-spheres	Tiny, round particles that contain the antibiotic minocycline	To control bacteria and reduce the size of periodontal pockets	The periodontist puts the micro-spheres into the pockets after scaling and root planing. The particles release minocycline slowly over time.
Enzyme suppressant	A low dose of the medication doxycycline that keeps destructive enzymes in check	To hold back the body's enzyme response — if not controlled, certain enzymes can break down gum tissue	This medication is in pill form. It is used in combination with scaling and root planing.

Surgical Treatments

Flap Surgery—surgery might be necessary if inflammation and deep pockets remain following treatment with deep cleaning and medications.

Bone and Tissue Grafts --- In addition to flap surgery, your periodontist may suggest bone or tissue grafts. Grafting is a way to replace or encourage new growth of bone or gum tissue destroyed by periodontitis.

Mechanical therapy---Brushing and flossing, as part of an oral hygiene routine, is the first-line approach to microbial reduction. The American Dental Association (ADA) recommends brushing for 2 minutes twice a day and flossing once a day.

Antiseptics---Antiseptics can be used topically or subgingivally. They are agents that kill oral microorganisms that cause gingivitis, periodontitis, and caries.

Rinses and irrigation---Antiseptic mouthrinses have been used to aid in controlling plaque buildup. They have been used to complement, not replace mechanical therapy.

Chlorhexidine gluconate---Chlorhexidine gluconate is available at 0.12% in the United States and has strong substantivity. Chlorhexidine is available only by prescription and is partly to fully covered by some prescription plans.

Toothpaste---**Triclosan** Triclosan is present in a toothpaste (Colgate Total; Colgate Palmolive, Piscataway, New Jersey) currently available in the United States. Triclosan is a substantive antibacterial agent that adheres to the oral mucosa, hard, and soft tissues for up to 12 hours.



Figure: Diagram of Toothpaste

COMMONLY USED ANTIBIOTICS IN PERIODONTICS

Eight principle antibiotic groups have been extensively evaluated for treatment of the periodontal diseases; tetracycline, minocycline, doxycycline, erythromycin, clindamycin, ampicillin, amoxicillin and metronidazole. A brief review of these drug groups is as follows:-

Tetracycline

Mode of Action

Act by inhibition of protein synthesis by binding to 30 S ribosomes in the susceptible organism.

Clinical use

- Adjuncts in the treatment of localized aggressive periodontitis (LAP).

- Arrest bone loss and suppress *A. actinomycetemcomitans* levels in conjunction with scaling and root planing.
- Tetracycline, minocycline and doxycycline are semisynthetic members of the tetracycline group that have been used in periodontal therapy.

Dosage regimen- 250 mg four times daily, inexpensive, lesser compliance.

Minocycline

- Effective against a broad spectrum of microorganisms.
- Suppresses spirochetes and motile rods as effectively as scaling and root planing, with suppression evident up to 3 months after therapy.
- Can be given twice daily, thus facilitating compliance.

Doxycycline

- Same spectrum of activity as minocycline.
- Compliance is favored since it has to be taken once daily, absorption from gastrointestinal tract is only slightly altered by calcium, metal ions, or antacids.
- The recommended dosage is 100 mg bid the first day, then 100 mg o.d. To reduce gastrointestinal upset, 50 mg can be taken bid.

Metronidazole

Mode of action

Metronidazole acts by inhibiting DNA synthesis.

Clinical use

- For treating gingivitis, acute necrotizing ulcerative gingivitis, chronic periodontitis, and aggressive periodontitis.
- As monotherapy, metronidazole is inferior, should be used in combination with root planing, surgery or with other antibiotics.

Penicillin

Mode of Action

Interfere with the synthesis of bacterial cell wall, inhibit the transpeptidases so that cross linking does not take place.

Clinical Use

- In the management of patients with aggressive periodontitis, in both localized and generalized forms. Recommended dosage is 500 mg tid for 8 days.
- Exhibits high antimicrobial activity at levels that occur in GCF for all periodontal pathogens except *E. corrodens*, *S. sputigena* and *Peptostreptococcus*, inhibits the growth of the gram positive facultative anaerobes.

Amoxicillin-Clavulanate (Augmentin)

The generally accepted strategy is to administer amoxicillin with an inhibitor of beta-lactamase such as clavulanic acid. Beta-lactamase-producing strains are generally sensitive to this preparation.

Cephalosporins

Mode of action

Same mode of action as penicillins, i.e., inhibition of bacterial cell wall synthesis. However, they bind to different proteins than those which bind penicillins.

Clinical use

Cephalexin is a cephalosporin available for administration in an oral dosage form.

- Achieves high concentrations in GCF
- Effectively inhibits growth of gram-negative obligate anaerobes, fails to inhibit the gram-negative facultative anaerobes.

Clindamycin

Mode of action

Inhibition of protein synthesis by binding to 50 S ribosome.

Clinical use

- Clindamycin achieves higher levels of antimicrobial activity than other antibiotics.
- Gordon *et al.* observed a mean gain of clinical attachment of 1.5 mm and a decrease of disease activity in patients 24 months after adjunctive clindamycin therapy.

SUMMARY

Chronic periodontitis, a common disease of microbial origin, is the major cause of tooth loss in adult humans. The disease serves as a convenient experimental model for analysis of many aspects of chronic inflammation. A consideration of currently available data has permitted the formulation of a new concept of the pathogenesis of this disease. The gingival tissues respond within 2 to 4 days to a beginning accumulation of microbial plaque with a classic acute exudative vasculitis which we have 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.

CONCLUSIONS

Diabetes mellitus is a disease of which the general public and practicing dentists and dental hygienists should be aware. On the basis of the available data, we can conclude that practicing dentists and dental hygienists can have a significant, positive effect on the oral and general health of patients with diabetes mellitus.

REFERENCES

1. Armitage G.C. *Periodontal diseases: Diagnosis.* *Ann Periodontol* 1996,1:37-215.
2. P.D. Marsh, *Host defences and microbial homeostasis: role of microbial interactions,* *J. Dent. Res.* 68, 1989, 1567-1575.
3. A.D. Haffajee, S.S. Socransky, *Microbial etiological agents of destructive periodontal disease,* *Periodontology* 2000,1994, 78-111.
4. W.E.C. Moore, L.V.H. Moore, *The bacteria of periodontal diseases,* *Periodontology* 2000,1994, 66-77.
5. W.B. Kaldahl, K.L. Kalkwarf, K.D. Patil, *A review of longitudinal studies that compared periodontal therapies,* *J. Periodontol.* 64, 1993,243-253.
6. P.C. Baehni, *Supportive care of the periodontal patient,* *Curr. Opin. Periodontol.* 4, 1997,151-157.
7. J.D. Suomi, J.D. West, J.J. Chang, B.J. McClendon, *The effect of controlled oral hygiene procedures on the progression of periodontal disease in adults radiographic findings,* *J. Periodontol.* 42, 1971,562-564.
8. W. Becker, B.E. Becker, L.E. Berg, *Periodontal treatment without maintenance. A retrospective study in 44 patients,* *J. Periodontol.*55,1984,505-509
9. W. Becker, L.E. Berg, B.E. Becker, *The long term evaluation of periodontal treatment and maintenance in 95 patients,* *Int. J. Periodontics Restorative Dent.* 1984, 54-71.