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ROLE OF SYSTEMIC ANTIMICROBIALS AS AN ADJUVANT TO NON-SURGICAL PERIODONTAL THERAPY IN TREATING PERIODONTITIS

Dental Science

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ABSTRACT

Periodontitis is a chronic inflammatory disease of periodontium. Dental plaque is the prime causative factor for periodontitis. Plaque loaded with periodontal pathogen will cause disease. It will induce our body's response to pathogen. Exaggerated response will leads to more destruction than repair, ultimately leading to periodontal destruction. Some periodontal pathogen has the capacity to invade tissues. These will trigger constant inflammatory response leading to excessive periodontal destruction. Non surgical periodontal therapy alone cannot eliminate tissue invasive pathogen. Therefore, in such cases systemic antimicrobials play a major role. Here, in our article we are going to review the role of systemic antimicrobials in treating periodontitis.

KEYWORDS

Systemic antimicrobials, periodontitis, non-surgical periodontal therapy

INTRODUCTION:

Periodontitis is a bacterial plaque induced inflammatory disease of periodontium. Plaque pathogenicity depends on the presence or increase in specific microorganism.[1] Plaque harbouring specific bacterial pathogens causes periodontitis, by mediating host tissues destruction.

The concept of tissue invasion of pathogens dated back to 1980's.[2] Mechanical periodontal treatment reduce bacterial mass, but major pathogens may escape due to tissue invasion or poor host defense.[3] Systemic antimicrobial therapy aims to kill pathogens that evades periodontal therapy. Antiviral drugs when administered in periodontitis had proven its efficacy.[4]

The purpose of this review is to discuss various systemic antimicrobials and their effect in the treatment of periodontitis.

RATIONALE:

The rationale for the administration of antimicrobials in the management of periodontitis is based upon the concept that the primary etiology of periodontitis is microbial. Dental plaque, calculus and other local factors are principal components that perpetuate the disease process. Mechanical removal of dental plaque and calculus was considered as a gold standard treatment for periodontitis. Administering systemic antibiotics may be a necessary adjunct in controlling bacterial infection in aggressive periodontitis, because in aggressive periodontitis bacteria can invade periodontal tissues, making mechanical therapy alone sometimes ineffective.[5]

Conditions that require the use of antimicrobials:

1) Continuing periodontal attachment loss despite diligent conventional mechanical treatment.
2) Aggressive periodontitis.
3) Medical conditions that predispose patients to periodontitis.
4) Acute periodontal infections which include periodontal abscess, acute necrotizing ulcerative gingivitis/periodontitis.[6]

Table 1.Systemic Antimicrobials administered in the treatment of Periodontitis[7]:

Agent	Regimen	Dosage/Duration
Amoxicillin	500mg	Three times daily for eight days
Azithromycin	500 mg	Once daily for four-seven days
Ciprofloxacin	500 mg	Twice daily for eight days
Clindamycin	300 mg	Three times daily for ten days
Doxycycline	100 mg	Once daily for 21 days
Metronidazole	500 mg	Three times daily for eight days
Metronidazole+amoxicillin	250 mg each	Three times daily for eight days
Ciprofloxacin+Metronidazole	500 mg each	Three times daily for eight days

Studies regarding application of antimicrobials in periodontitis treatment:

Collins et al. (1993) conducted a study in patients with adult periodontitis who were refractory to periodontal surgery. A course of systemic 250mg amoxicillin/125mg clavulanate every six hours was given for two weeks to eliminate tissue reservoirs of pathogens. Repeated full-mouth subgingival irrigation with povidone-iodide was done for six visits during the same period, to eliminate the tooth-associated pathogens; and chlorhexidine (0.12%) mouthwash was rinsed twice daily. Marked reduction in pocket depth and overall gain in attachment was achieved at six weeks and three months after treatment with systemic antimicrobial and local antiseptics.[8]

Rooney et al (2002) evaluated the adjunctive benefits of amoxicillin (250 mg) alone and metronidazole (200 mg) alone and as combined regimen, to scaling and root planning in chronic periodontitis patients. The clinical examinations were performed at pre-treatment, and one, three and six months post treatment. Improvement in clinical and microbiological parameters was significant in amoxicillin plus metronidazole group than in other groups.[9]

Guentsch et al (2008) conducted a randomized, prospective, clinical multicentre trial in subjects with severe chronic periodontitis to compare the impact of systemic moxifloxacin (400 mg OD for seven days) to systemic doxycycline (200 mg on the first day followed by 100 mg for next nine days), as an adjuvant to scaling and root planing (SRP) on the success of periodontitis treatment. In control group only scaling and root planning was done. After six and 12 months reduction in pocket depth was significantly greater in moxifloxacin group when compared to doxycycline group and controls. Only in the moxifloxacin group the load of all investigated bacteria and all inflammatory parameters was reduced at each appointment compared to baseline.[10]

Han et al examined the impact of azithromycin (500 mg OD for three days) in combination with non-surgical periodontal therapy on clinical as well as microbiologic parameters and gingival crevicular fluid (GCF) MMP-8 levels, in patients with generalized severe chronic periodontitis. *Fusobacterium nucleatum* was significantly reduced in all visits in the azithromycin group, with the levels also being lower compared with those of the placebo group. The azithromycin and placebo groups exhibited significant reduction in GCF MMP-8 levels at the post-treatment visit and at two weeks.[11]

Martande SS et al showed improvement in periodontal and microbial parameters in chronic periodontitis patients treated with roxithromycin (RXM) as an adjunct to non-surgical periodontal therapy when compared to non-surgical periodontal therapy alone. Percentage of sites positive for periodontopathic bacteria *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis and Tannerella forsythia* had been reduced.[12]

Suryaprasanna J et alassessed the ancillary effects of oral clarithromycin along with non-surgical periodontal therapy in chronic periodontitis. In test group scaling and root planning (SRP) plus oral clarithromycin (500 mg thrice daily for seven days, orally) was given and in control group only SRP was done. There was a significant reduction in periodontal parameters and serum C-reactive protein levels by six months. The mean colony-forming units (CFU) of *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* showed a statistically significant reduction from baseline to three months only in the test group but reduction being insignificant after six months.[13]

Systematic reviews and meta-analysis reports:

In a systematic review, Herrera *et al* concluded that systemic antimicrobials as an adjuvant to SRP edges over SRP alone in the treatment of periodontitis, in terms of improvement in periodontal and clinical parameters.[14] In a metaanalysis, Sgolastra et al concluded that significant improvement in periodontal parameters was evident in aggressive periodontitis patients when systemic amoxicillin with metronidazole was administered with conventional periodontal therapy. In his another metaanalysis, similar results was achieved in chronic periodontitis patients also.[15,16]

Anti-viral therapy:

Fu YW 2014evaluated the clinical benefit of valacyclovir when performing full-mouth periodontal debridement in patients with advanced chronic periodontitis in randomized clinical trial. Patients in the valacyclovir - treatment group had higher pocket depth reduction than those in the placebo-treatment group, by two months and six months post therapy.[17] Scaling and root planing along with oral valacyclovir (500 mg twice daily for ten days can suppress high copy counts of periodontal Epstein-Barr virus to undetectable levels for at least one year with improvement in periodontal parameters.[18]

Summary:

Antimicrobials since its discovery are a boon to mankind. From the invention of penicillin to till now, antimicrobials are serving us to lead a healthy life. Use of antimicrobials as an adjuvant to periodontal therapy will be of great use in patients with aggressive and refractory periodontitis, who are not responding to conventional therapy. According to Art of war "Fight the enemy where they can't", we have to fight the periodontopathogens using specific antimicrobials after disrupting the biofilm by performing scaling and root planing, where they can't fight against the antimicrobials administered.

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