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Editorial

Periodontal Diseases and Perioceutics

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Editorial

This is the letter to the editor covering the importance of Perioceutics in the management of periodontal diseases. Oral health issues like gum diseases, periodontitis, caries and plaque are great healthcare concern worldwide. However, it is the most ignored one also. Unawareness amongst population about oral care is the most influencing factor for increased incidence of periodontal disease [1]. Poor dental hygiene, dietary deficiency (calcium and Vitamin D), cigarette smoking, genetic factors, stress, systemic diseases like diabetes and some drugs are considered risk factors in aggravating the gum diseases and periodontitis [2, 3]. Periodontal diseases are multifactorial inflammatory diseases associated with gums and teeth characterized by destruction of bones and connective tissue [4]. It is an opportunistic infection developed by growing of gram negative bacteria within the periodontal pockets. Bacteria's like Actinobacillus actinomycetemcomitans, Porphyromonas gingivalis, Dialister pneumosintes, Bacteroides forsythus and Treponema denticola and fungus like Histoplasma and Aspergillusniger are considered important causative organisms [5].

Periodontal pockets are niche created by periodontopathic pathogens due to destruction of soft tissues supporting teeth and clinical attachment. Depending on depth of pockets the severity of periodontitis has been classified as mild (less than 3mm), moderate (between 3 to 4mm) and severe (more than equal to 5mm) [6]. However, microorganisms are primary etiologic factors for periodontitis, but it is well established that host defense response is also accountable for the disease. Host derived enzymes like MMPs (matrix metalloproteinases); inflammatory mediators like cytokines, prostanoids are responsible for destruction of periodontal tissue [7].

Treatment and drug development in the field of periodontitis is very important as it is found to be associated with some systemic diseases like cardiovascular disease, myocardial infarction, atherosclerosis, bacterial pneumonia, nephropathy and end stage renal disease [8, 9]. Periodontitis and systemic diseases are interconnected via circulation of cytokines and other inflammatory mediators in blood. Also, untreated condition of periodontal diseases will cause spreading of infection to other tissues and systemic circulation.

First line treatment of periodontitis is done by Scaling and Root Planning (SRP) or tooth extraction. The causative organisms' forms biofilms around teeth called plaques, which can only be removed mechanically following SRP [10]. However, SRP alone does not completely eliminate all virulence factors; therefore, antibacterial therapy is recommended as complementary to mechanical treatment. Increased prevalence of oral diseases has prompted the development of novel drugs and drug delivery systems by formulation scientists.

"Perioceutics" is a pharmaceutical field which deals with the development of drugs and medicine for the management and treatment of periodontal diseases [4, 11]. As the name suggests it is constituted by the highlighted portions of two words 'periodontitis' and 'pharmaceutics'. Systemic administration of antimicrobials poses side-effects and is less patient complaint. Moreover, it requires long term administration and exposes body to the larger dose of drug causing antibiotic resistance, adverse drug reactions, and organ damage (liver and kidney) [5, 12]. Also, very little concentration of drug is achieved in Gingival Crevicular Fluid (GCF)

Present in periodontal pockets due to loss of drug during circulation to other body parts [13]. Since the periodontal infections are restricted to periodontal pockets, intra-pocket administration of drugs will prove to be more beneficial than the conventional systemic therapy [5, 10]. Therefore, for improving drug delivery intra-pocket targeting of microbes in the pocket is preferable approach in 'Perioceutics'.

Single or combination of antimicrobial agents given within the pocket, will minimize their systemic side-effects and covers broad range of microbes. Drug selection should be based on molecular understanding of prevalence, resistance and spectrum of action of pathogens. Further, targeting to microorganisms using novel drug delivery systems like films, fibers, microparticles, nanoparticles, liposomes, and nanofibers etc have given new direction to the periodontal treatment strategy. Many of these formulations are available in the market as Periochip®, Atridox®, Arestin®, Actisite®, Dentomycin®, and Elyzol® [1].

With the advancements of Perioceutics, researchers are more concerned about minimum use of antibiotics as they develop resistance against microbes and cause side-effects. Nowadays, they are more focused towards development of host modulating agents, biofilm inhibitors, antibodies, antiseptics and low dose antibiotics [7]. Further, drugs acting through unconventional novel mechanisms like vaccines, bone resorption inhibitors, collagenase, cytokines and MMP inhibitors are promising therapeutic methods under research. Periostat® is a most commonly marketed product which contains very low dose of Doxycycline (20mg) and possess collagenase and MMP inhibitory action [14]. The use of a host modulatory agent, or a combination of host modulatory agents, can assist in the conventional treatment for periodontitis.

It is more beneficial to develop medicines which have multi-actions like antimicrobial, anti-inflammatory, antioxidant features all together to aid regeneration of damaged gums, reducing pocket depth, improving tooth attachment and eradicating infections. In addition, long acting therapeutic modalities which can maintain desired drug

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concentrations at the site of action will circumvent major barriers associated with the chronic periodontal therapy viz. undesirable side effects, high cost of therapy, revisiting dentist and fear of pain and discomfort amongst patients. Nevertheless, intra-pocket drug delivery systems must be biodegradable, biocompatible and bioadhesive. Application of pharmaceutics like use of mucoadhesive polymers, in-situ forming gels; viscosity modifiers, plasticizers etc could enhance retentions of medicines within pockets for prolonged time [10]. This approach will improve the effects of already existing antibiotics. However, the effective therapeutic means for periodontitis are still lacking. Therefore, novel drugs and drug delivery systems producing equivalent actions to mechanical therapy are needed to be developed.

It is most popular saying that 'prevention is better than cure' which can be applied effectively to the oral health diseases. Periodontitis can be prevented by maintaining regular dental hygiene by using toothpastes and mouthwashes on daily basis. Moreover, warning signs like swollen and reddish gums, formation of pocket between teeth and gums, pus formation, bad breath, bad taste are some warning signs of periodontitis and should be taken into serious attention. Serious consequences of periodontitis may lead to loss of tooth and self-esteem of the person. A healthy mouth is directly associated with the smile, confidence and esthetics of a person. Finally, people should take care of their mouth with same priority as other body parts and organs as all parts of whole body are interconnected via blood circulation. Problem in one part will directly or indirectly affect the other part.

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