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\Perioceutics- A Review

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ABSTRACT Periodontitis is the most common disease entity affecting oral cavity next to dental caries. In the earliest stage the infection affects the gums and as the disease progress, the supporting structures of the tooth are affected. Periodontitis starts due to Gram-negative bacteria on teeth forming a biofilm and leading to an immune response from the body. "Perioceutics" or use of the pharmacological agents to specifically manage periodontitis is an interesting and emerging aids in the development of periodontal disease along with the mechanical debridement. Compared to other therapeutic modalities employed against infection, perioceutics potentially is non-invasive, has fewer side-effects and does not require complicated application method. This paper review 'Perioceutics' which in future will be the effective tool for dental practitioners when used as adjunct to mechanical therapy in treating periodontal diseases.

KEYWORDS- Periodontitis, Perioceutics, Local drug delivery, Host modulation therapy, Antimicrobial therapy

INTRODUCTION-

Periodontitis is the most common disease entity affecting oral cavity next to dental caries. In the earliest stage the infection affects the gums/ gingiva and as the disease progress, the supporting structures of the tooth which includes cementum, periodontal ligament and alveolar bone are affected resulting in loosening of tooth.[1]

Ignorance amongst population about oral care is the most prompting factor for increased incidence of periodontal disease. According to World Health Organization, the importance of periodontal disease was emphasized as a world health threat in view of its deleterious systemic effects and its worldwide distribution.[2]

Periodontal diseases are multifactorial in nature which are initiated by Gram-negative tooth-associated pathogens organized as a biofilm, whose presence elicits a host inflammatory response. The inflammatory host response resulting from this bacterial infection leads to progressive destruction of the supporting periodontal structures. The interaction of microorganisms with the host also determines the course and extent of the resulting diseases.[2]

"Perioceutics" or use of the pharmacological agents to specifically manage periodontitis is an interesting and emerging aids in the development of periodontal disease along with the mechanical debridement. The term Perioceutic was first introduced by Heska Corporation (Fort Collins,CO) which is combination of terms periodontal and therapeutic which includes antimicrobials, host modulatory therapy and local drug delivery in the management of periodontal disease along with mechanical debridement.[3]

In 1998, this corporation filed to protect the 'perioceutic' trademark for labeling periodontal therapeutic gels especially for use in veterinary field, but in 2000 this trademark was abandoned. However, this term is currently being used to address the pharmacotherapeutic agents specifically developed to better manage periodontitis. This field of "perioceutics," that includes antimicrobial therapy, local drug delivery and host modulatory therapy to produce beneficial changes in the microflora and host response, respectively, has emerged as a vital aid in the management of susceptible patients who develop periodontal disease.[4]

HOST MODULATION THERAPY-

The shift in paradigms with emphasis on host response, has led to the development of host modulatory therapies. The primary aim of a host modulatory agent, an essential component of perioceutics is to rebalance the levels of pro-inflammatory mediators and destructive enzymes, as well as anti-inflammatory mediators and enzymes. HMT is a treatment concept that aims to reduce tissue destruction and stabilize or even regenerate the periodontium by modifying or down regulating destructive aspects of the host response and up regulating protective or regenerative responses.[3]

The concept of host modulation was first introduced to dentistry by Williams[5] in 1990 and Golub et al[6] in 1992 and later on expanded by many researchers. They concluded that "there are compelling data from animal and human trials indicating that pharmacologic agents that modulate the host responses believed to be involved in the pathogenesis of periodontal destruction may be effective in slowing progression of periodontal disease.

The rationale behind HMT is to aid the host in its fight against infectious agents by supplementing the natural inherent defence mechanisms or to modify its response by changing the course of inflammatory systems. Various host modulation agents have been developed and are currently being investigated, examples of these agents are NSAIDs, tetracyclines, chemically modified tetracycline, anti cytokines agents (recombinant tissue inhibitor of matrix 1/TNF blockers), recombinant metalloproteinase synthetic metalloproteinase, bisphosphonates, etc.[7]

ANTIMICROBIAL THERAPY-

Even though mechanical debridement removes plaque which contains microorganisms, it's impossible to completely eradicate all virulence factors, therefore antibacterial therapy is recommended as supplementary measure. Antimicrobial agents are chemotherapeutic agents that reduce the amount of bacteria present either by superficial targeting certain organism or by non specifically reducing all bacteria.[8] Chemical antimicrobial agents may gain access into the

periodontal pocket through both a systemic and local route of delivery. Systemic antimicrobial agents enter periodontal pockets following their intestinal absorption and passage from the blood stream into oral tissues, gingival crevicular fluid and saliva. Selection of suitable antimicrobial agent is based on the knowledge of specific pathogens causing the disease, antibiotic resistance patterns in microorganisms, prevalence of microorganisms, spectrum of activity, minimum inhibitory concentration and concentration achieved in GCF. In order to minimize the risk of failure of therapy, antimicrobials with broad spectrum of activity are preferred.[9]

Also systemic administration has been useful in treating periodontal pockets, but repeated, long-term use of systemic antibiotics is fraught with potential danger including resistant strains and superimposed infections. Local administration, therefore provide a useful answer to these problems.[9]

LOCAL DRUG DELIVERY-

Since, periodontitis is a localized disorder, it is more preferable to administer drugs locally into the periodontal pocket than systemically. The scientific rationale behind the use of local delivery of antimicrobial agents in periodontal pockets is to kill or inhibit subgingival bacteria by using the drugs at the site i.e. pocket, with no or minimal systemic side effect.[10] The important factor in the success of this treatment is the ability to control and to prolong the release rate of the therapeutic agent from the device. Because the periodontal pocket is relatively inaccessible, various techniques are being developed to deliver the antibacterial agents into the periodontal pocket, such as intra pocket irrigation and intrapocket sustained release delivery system. Localized drug delivery systems are widely studied for various applications.[11] Essentially, local delivery of antimicrobial agents for periodontal treatment can be achieved by namely, immediate release or fast acting and controlled release devices. Immediate release systems include mouthwashes, irrigation solutions, toothpastes and chewing gums, etc.[12] They provide immediate release of medicament and hence, provide fast action but for short duration whereas controlled release systems provide slow and prolonged action. Controlled release devices can be biodegradable and non biodegradable depending on the polymers employed for its preparation. Biodegradable devices get dissolved at the site while non-biodegradable types are required to be removed from the site of action.[13,14]

CONCLUSION-

Periodontal disease is an immuno-inflammatory condition involving the tissues that surround and support the teeth. Till date backbone of periodontal treatment is still mechanical removal of plaque and calculus deposits from supra and sub gingival environment whereas complete elimination of these deleterious agents are quite unrealistic as the pocket depth increases. Intra pocket administration of drug via local drug delivery system have shown to achieve better clinical results when used as an adjunct to conventional non-surgical periodontal therapy, as periodontal pockets holds gingival crevicular fluid for the controlled release delivery of antimicrobials directly. This has steered the field of perioceutics which involves using antimicrobial as well as host modulatory agents for the benefit of periodontium. The recognized importance of the host inflammatory response in the pathogenesis of periodontal diseases presents the opportunity to explore new treatment strategies.

Multicentre clinical trials are necessary to fully evaluate the benefits of these agents and to weigh their usefulness against the risks associated with their long-term administration. Furthermore,

continuous research in this field would also enable fabrication of individualized treatment for periodontal disease targeting inflammatory host response.

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