Pathogenic to Non-pathogenic flora - The Probiotic route

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ABSTRACT:

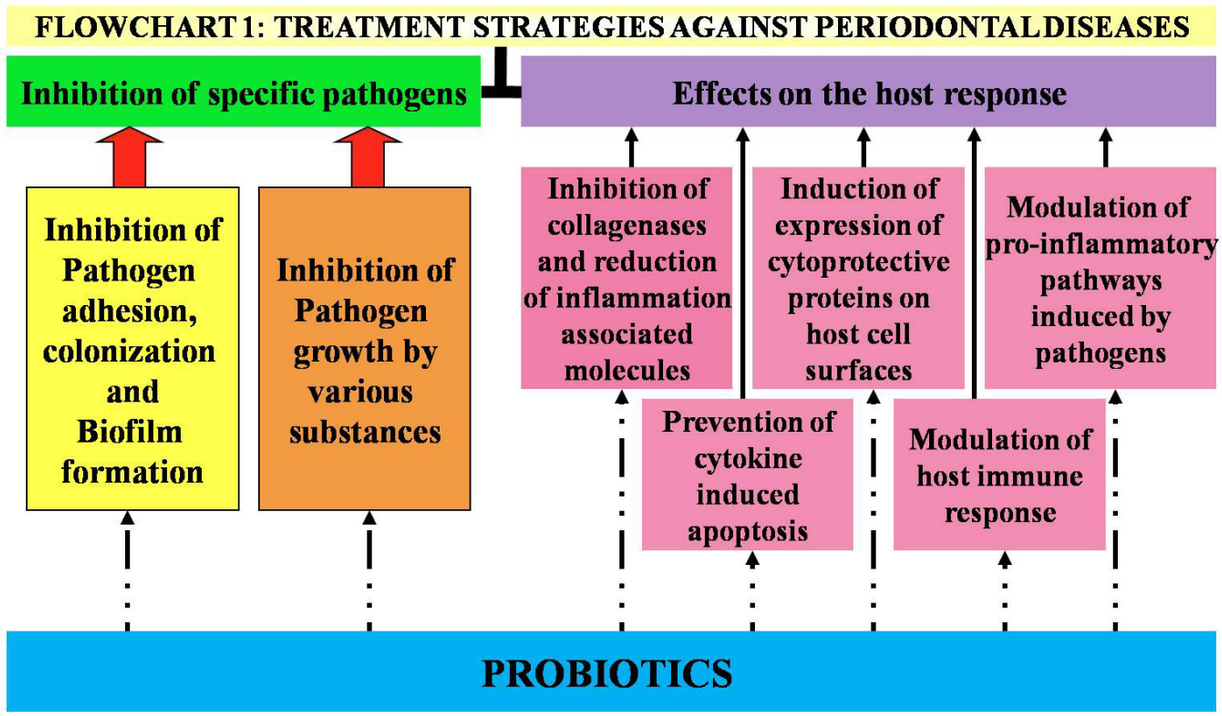
Periodontal disease is a multifactorial infection of the periodontal attachment apparatus with the virulent strains of periodontopathic bacteria playing a main role in the initiation of the periodontal breakdown process and the other factors including the interplay of host immunoinflammatory response to the bacteria, superimposing genetic influences and environmental factors including systemic illness, smoking, stress and other miscellaneous factors. This article aims at explaining the useful role of probiotic therapy, by which the pathogenic species of the plaque biofilm can be replaced by a non-pathogenic flora.

Key words: Probiotic therapy, Periodontopathogens, Periodontal disease, Preventive periodontal therapy

INTRODUCTION

Numerous studies have been carried out in the past to comprehend the primary cause of initiation and progression of periodontal disease. A variety of models on the pathogenesis of periodontitis have depicted the numerous factors involved in the process, among which the host bacterial interactions play a major role. However, current evidence proves that destruction of periodontium is mediated by the host but the initial driving force is the bacterial challenge.[1] Hence, periodontal therapeutic modalities must aim at conversion of the pathogenic plaque biofilm to a non-pathogenic harmonious environment to optimize and balance periodontal health. This article highlights the use of probiotic therapy by which the pathogenic species of the plaque biofilm can be replaced by a non-pathogenic flora. Probiotics are defined as live micro-organisms

that, when administered in adequate amounts, confer a health benefit to the host.[2] The use of probiotic therapy is the strongest emerging field in Periodontics and it employs the application of health-promoting bacteria for therapeutic purposes.[3] A probiotic treatment strategy against periodontal diseases is primarily aimed at inhibition of specific periodontopathogens and secondarily alters the host response mechanism. Probiotic therapy mainly employs the use of specific strains of Lactobacillus and Streptococcus species. The probiotic strains of bacteria mainly used in therapy include Lactobacillus casei, *(Lactobacillus acidophilus, Lactobacillus reuteri, Lactobacillus brevis, Lactobacillus salivarius, Streptococcus sanguinis, Streptococcus salivarius and Strptococus mitis.)* They are administered in the form of tablets or lozenges or by incorporation within mouthwashes, medical mixtures or periodontal dressings. They act on pathogenic flora by inhibition of pathogen growth, adhesion to the host surface, colonization and subgingival biofilm formation[4]. The effects on host response mainly include inhibition of collagenase enzymes and reduction of inflammation associated factors, induction of expression of cytoprotective proteins on host cell surfaces, modulation of proinflammatory pathways induced by periopathogens, prevention of cytokine induced apoptosis and modulation of host immune response[4].(Flowchart 1)



Discussion:

Numerous studies have been carried out to test the use of a probiotic strain of bacteria for treatment of periodontal disease. Results of studies on health effects of probiotics in periodontal disease exhibited a significant reduction in the number of periopathogens and extension of remission period[5], reduction in the signs and symptoms of gingivitis and periodontitis.[6,7,8] Normalization of microflora,[6] improved clinical parameters and shift to gram positive bacteria,[4] delay in subgingival recolonization by periopathogens,[9] improvement of clinical parameters in periodontitis in smokers &

non-smokers[10] and finally suppression of black pigmented bacteria & halitosis producing bacteria.[11] Most recently, a systematic review on the microbiological and clinical effects of oral probiotics on periodontal health published the report that probiotics does exert a positive effect on the oral microbiota.[12]

Conclusion:

The main microbiological goal of periodontal therapy is to achieve a reduction in the counts, proportions and percentage of sites colonized by pathogenic micro-organisms. Future studies must be directed towards utilizing inactivated micro-organisms and their cell components to exert beneficial effects for the host. Till date, no single strain of lactobacillus has succeeded in inhibiting all types of periodontal pathogenic bacterial strains and future studies must also be aimed in the direction of isolating that particular strain of lactobacillus that can significantly inhibit the potent strains of periopathogens. Future studies must also be directed towards the use of lactobacilli in delivering antibiotics against periodontal pathogens thereby combining probiotic and antibiotic effects to achieve a superlative result. There is an urgent need for properly conducted clinical trials where probiotics are used as adjuncts to standard periodontal care.[12]. Also, since periodontal medicine is a strong emerging field, if, by probiotic intervention, the range of human immuno-inflammatory reactions could be reduced, the advantages for human health, in general, could be substantial.

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