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ORAL HYGIENE: KEY TO THE ORAL WELL-BEING

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INTRODUCTION

Dental hygiene is the practice of keeping our oral cavity clean to prevent the colonization of pathogenic microorganisms, mainly bacteria. Simply put, a hygienic oral cavity refers to clean teeth, gingiva, tongue, the floor of the mouth, surrounding mucosal surfaces free from plaque bacteria (CDC, WHO). Poor oral hygiene refers to abstinence from daily toothbrushing habits, mouth rinsing for removal of the dental plaque and *materia alba*, and periodic visit to the dental hygienist for professional oral prophylaxis.[1, 2] Several studies have explained the negative impact of poor oral hygiene. It is the principal etiologic factor in the initiation and progression of oral tissue destruction. Lack of oral hygiene is responsible for developing dental plaque-causing dental caries and periodontitis, significant diseases affecting the oral cavity.[3, 4]

Dental plaque: The determinant of oral hygiene

The dental plaque, also known as the "Biofilm", is a complex three-dimensional network of pathogenic bacteria such as streptococcus. Such bacterial biofilms are ubiquitously present in various regions within the human body.[5] In the oral cavity, bacterial biofilms are present over tooth surfaces and oral mucous membranes, including gingival and periodontal tissues.[6] Bacteria in the dental plaque accumulate over the tooth surfaces and gingival crevice, initiating inflammation, resulting in periodontal pocket formation, allowing increased bacterial accumulation damaging dental tissues. These inflammatory reactions release numerous mediators, activating a cascade of tissue destruction signaling pathways destructing periodontium.[7]

Pathogenic plaque bacteria attach to the dental biofilm promoting the adhesion of different kinds of bacteria to the tooth surface and gingival sulcus. The toxic products and virulence factors of plaque bacteria initiate a series of reactions.[8] Bacterial enzymes decompose the glucogenic food particles adhered on the tooth surfaces, releasing acid that demineralizes the tooth's hard tissues, enamel, and dentin, which constitute the tooth's white crown. Severe demineralization of the hydroxyapatite crystals ultimately leads to tooth decay, initiating dental caries. In simple words, prolonged exposure of plaque bacteria to tooth surfaces causes cavity formation due to dental caries formation.[9,10]

Furthermore, dental plaque pathogens cause inflammatory reactions when they accumulate within the gingival crevice destroying the epithelial cells of junctional epithelium giving rise to gingivitis.[7] Prolonged exposure leads to periodontal inflammation called periodontitis degrading periodontal ligament fibers, predominantly type 1 collagen, which connects the roots of the tooth to the alveolar bone, housing the tooth firmly into the bony socket, making it immobile. Based on the concept, this study proposes that dental plaque bacteria are the roots of all kinds of oral diseases. Hence, biofilm is the primary etiologic factor in the pathogenesis of oral diseases. Therefore, measures must be taken to prevent the pathogenic dental plaque's formation and progression harboring multiple acidogenic bacteria.[11]

Periodic removal of the biofilm is the key to good oral hygiene. Several mechanical and chemical interventions could remove the biofilm.[12] Mechanical methods such as cleaning teeth and gingiva (gums) by dental professionals known as oral prophylaxis and tooth brushing at home remove dental plaque, prevent the adhesion of bacteria to the tooth surfaces, and gingival crevice. Bacterial plaque must be removed to inhibit the oral tissue destruction at the initial stages. Thus, dental professionals recommend methods to maintain optimal oral hygiene to minimize the dental plaque's pathogenicity.[13]

Chronic exposure to plaque bacteria causes a wide range of oral disorders such as dental caries, gingivitis, periodontitis, abscess, eventually resulting in tooth decay, root resorption, gingival recession, alveolar bone loss, tooth mobility, tooth loss, and in severe cases, the infection extends to the oro-facial regions causing space infections and life-threatening Ludwig's angina.[14] In most cases of tooth mobility, tooth extraction is the only choice of treatment. Loss of tooth causes further anomalies by disrupting the normal occlusion of the dentition. All these severe complications could be prevented by maintaining good oral hygiene by adopting appropriate oral habits in daily life. It can be inferred that oral hygiene

practices to remove the dental plaque are quintessential to prevent these irreversible dental complications. It must be noted that oral hygiene is integral for good oral health and overall well-being.[15,16]

From dental plaque to the calculus

The acute lack of oral hygiene dental plaque continues to accumulate for prolonged periods and eventually undergo calcification. These calcified dental plaques are known as calculus which cannot be removed by traditional oral hygiene habits and requires professional cleaning. Dental calculus is irreversibly formed when there is mineral deposition within the bacterial network of dental plaque.[17] People practicing regular oral hygiene are less likely to develop subgingival calculus, which is the critical etiologic factor for periodontal diseases and tooth mobility. If people are not taking any measures for professional cleaning of the teeth to remove dental calculus at initial stages, it forms throughout the dentition damaging the oral health significantly. Hence, early debridement of the dental plaque will prevent the formation of calculus. This remains the cornerstone of periodontal therapy.[18]

Managing dental plaque

Complete eradication of dental plaque is not plausible. However, the pathogenicity of plaque bacteria can be reduced by different methods. Professional cleaning of the tooth, known as ultrasonic scaling, is a procedure that removes supra and subgingival dental plaque and calculus, which are the principal causes of all kinds of oral diseases.[16]

Behavioral methods for managing dental plaque

People should maintain good oral hygiene by incorporating oral hygiene practices into their daily lives. The most crucial method is toothbrushing, which removes the dental plaque by cleansing its bristles' action over the tooth surfaces. Toothbrushing twice a day reduces plaque bacteria adhesion to the tooth and mucosal surfaces, reducing the risk of pathogenicity considerably.[19] However, toothbrushing alone is not enough to remove the dental plaque from inaccessible areas of teeth. Toothbrushing should be supplemented by other mechanical aids such as dental flossing and interdental cleaning with specialized interdental brushes. Interdental cleaning aids help remove the dental plaque from the interdental and gingival spaces, which are important sites for dental plaque accumulation. These spaces are hard-to-reach and inaccessible for a toothbrush.[20]

IN addition to mechanical methods, using topical antimicrobials and chemotherapeutics like dentrifices play a significant role in maintaining good oral hygiene. Dentrifices and different mouth rinses reduce plaque pathogenicity by their antibacterial actions on cariogenic bacteria. These agents inhibit the abnormal growth and accumulation of bacteria in the oral cavity. Mouthrinses can be used at regular intervals, particularly after meals and snacks, to interject bacteria's decomposing action on the food substrate, releasing acids destructing oral tissues. It is clear from the above discussion that maintaining oral hygiene is quintessential to prevent several oral diseases by plaque bacteria.[21, 22]

Poor oral hygiene and overall health

Plaque bacteria that accumulate due to lack of oral hygiene cause oral tissue destruction and are also associated with several chronic debilitating diseases. Plaque-initiated periodontitis has been associated with several systemic diseases such as chronic respiratory disease, rheumatoid arthritis, cardiovascular disease, Diabetes mellitus.[23] Studies reported that the molecular mechanisms triggering these diseases due to periodontal microorganisms are elusive and need further research. Meanwhile, it has been proposed by many researchers that cytokines such as interleukin-1 [IL-1], Interleukin 6 [IL-6] are the major mediators of tissue destructing signaling pathways initiating these diseases.[24] Hence, poor oral hygiene has a negative impact on overall health and well-being. Exploring the molecular pathways and signal transduction concerning plaque microorganisms involved in chronic diseases' etiopathogenesis needs further research.[25]

CONCLUSION

To conclude, toothbrush, professional cleaning, and appropriate mouthrinse minimize plaque bacteria's pathogenicity maintaining good oral hygiene. At the population level, there is a need to implement various oral health promotion programmes to narrow-down the prevailing oral health inequality, particularly among the deprived communities unable to access oral health services due to several social, economic, and environmental factors.

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