Understanding the Korean's oral microorganisms: Biofilm-producing properties of *Streptococci*

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Objectives: Plaque can harden under gum line into tartar and become a habitat for the anaerobic bacteria responsible for periodontitis. *Streptococci*, dominant commensal bacteria, are known to be responsible for the initiation of periodontal disease by producing biofilm. However, there are conflicting reports of their role; they present in a high proportion in the healthy group and reduces the harmful bacteria associated with periodontitis. Thus, understanding the Korean's oral microorganisms, especially *Streptococci* is needed. Through them, we tried to propose new formulations and oral care products.

Methods: Major periodontal pathogens were analyzed by real-time PCR and Next-Generation Sequencing (NGS) in saliva from 93 adults aged 25-59 years and 10 kids aged 4-12 years. In addition, to clarify which *Streptococcus* species harmful for oral health, we defined and selected them depending on their properties of biofilm and acid production.

Results: PCR analysis revealed *Streptococcus* species and *F. nucleatum* presented in all ages with high proportion. The increase of *Streptococci* was correlated with the increase of *F. nucleatum* indicating the responsibility for the initiation of periodontal disease. Among them, *S. mutans*, *S. sanguinis* produced thick biofilm by metabolizing sugar and further caused pH reduction inside the biofilm. They were detected in Korean population 19/80 (0.016%) and 76/80 (0.622%), respectively. The biofilm formation of *S. mutans* was inhibited by sucralose (46.8%), xylitol (45.1%), stevia (21.3%), Sodium methyl cocoyl taurate (78.2%), propolis (69.0%), Centella asiatica extract (100%) and Lactoferrin (28.5%). Also, biofilm of *S. sanguinis* was inhibited by Sodium methyl cocoyl taurate (72.8%), Centella asiatica extract (98.3%) and Lactoferrin (94.2%)

Conclusions: This study revealed the importance of management of *Streptococci* producing biofilm responsible for the initiation of periodontal disease. In addition, by demonstrating the effective ingredients that inhibit their biofilm production, effective oral health products can be developed further.

Keywords: Streptococcus species, *S. mutans*, *S. sanguinis*, biofilm, sucrose, xylitol, stevia, Sodium methyl cocoyl taurate