Next-Gen Sequencing Analysis of Dental Biofilm Microbiome upon Gifts Nano Charcoal Cleaning

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Dental diseases can be prevented if early colonizers (Streptococcus) can be reduced in biofilm before they mature into dental plaque. Usually these organisms attach to tooth surface within few hours after oral cleaning. Since most research studies are done on subjects with already matured plaque, which would not address the impact of dental cleaning on biofilm formation, I conducted this research using fresh biofilm from the enamel. The healthy volunteers were (N=57) randomly divided into 4 groups (N=14 in each group) and did oral cleaning with 1. Toothpaste Brushing & tongue cleaning twice a day (BT). 2. Gum and tooth rubbing with finger and swishing with water (GIFTS) after each meal or snack. 3.GIFTS method twice a day with Nano-charcoal (CT). 4. Brushing only morning (MT). Saliva, plaque and tongue scrapings samples were collected on day zero and then after 10 days of oral cleaning. DNA from these samples were analyzed for changes in the biofilm microbiome with qPCR and next generation sequencing. ANOVA analysis showed that in GIFTS and CT method, the total bacterial count decreased by 10 to 13 folds in Saliva ($P<0.001$), Plaque ($P<0.003$) and Tongue scrapings ($P<0.03$). Metagenomics data showed high percentage of Streptococcus in BT(14%), while low in GIFTS and CT(1%). Since Nano charcoal method was the best method, an abrasive test (Mohs) was done and found to be safe on tooth enamel. I conclude that frequent disruption of biofilm by GIFTS method (finger rubbing of gum, tooth and water swishing) after each and every meal, snack, or drink, prevents early colonizers in biofilm & plaque formation. This paradigm shifting study recommends adding Nano Charcoal with GIFTS to prevent periodontal and associated deadly diseases like cancer, diabetes & heart diseases.

Awards Won:

Third Award of $1,000