

Metagenomics, Digital & qPCR Molecular Analysis of Bed-Time Oral Brushing

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Everybody knows that cleaning the oral cavity is good for oral hygiene. However, not everyone knows that during the night sleep, when our mouth doesn't do saliva flushing, bacteria grows a lot, causing many deadly diseases. This study tested specific dental damaging bacteria, using 3 different bedtime oral cleaning methods. 1. Toothpaste Brushing + Tongue-cleaning (BT) 2. Gum and tooth Inner Finger rubbing + Tongue-cleaning (GIFT) 3. Rice-husk Charcoal Powder Finger rubbing + Tongue-cleaning (CT) To reduce variations in the testing methods, 70 subjects performed all 3 cleaning methods (Repeated Measures Design). The subjects ate raw cane sugar cubes before going to bed and without cleaning their mouth, for 2 nights (control). They did all 3 cleaning methods separately for 2 nights each. Every morning, saliva was spit in a DNA extraction tube. A second trial was done after a gap of one week. DNA from 960 saliva samples were analyzed in 5,184 qPCR, 92 Droplet Digital PCR & 20 Metagenomic Sequencing reactions using universal & specific dental damaging bacterial primer probes. ANOVA & posthoc statistical analysis showed a significant decrease in dental damaging bacterial counts in all 3 methods. However, CT has additional advantages of removing bad-breath and whitening teeth. Charcoal obtained by activating rice husk in 3 novel ways, showed adsorption differences in Isotherm studies, in general & dental damaging bacteria in saliva. This study successfully developed a simple, healthy, cost-effective (\$0.0019/year), microbiome and eco- friendly technology for recycling abundantly available rice-husk into a highly adsorbing charcoal, which can reduce plastic usage by both developed and developing countries, for better oral hygiene to enjoy good health.

Awards Won:

Fourth Award of \$500