Antimicrobial Efficacy of US and Mexico Multibenefit Dentifrices

M. Zsiska*, J. Gruner and D.J. White

The Procter & Gamble Company, Mason, OH

ABSTRACT

Laboratory testing is often used to predict clinical activity of multibenefit fluoridated dentifrices. To compare antimicrobial actions, the efficacy of formulations can be assessed in plaque growth or metabolism assays (e.g. J Clin Dent 6: 59-70, 1995). Objectives: This study compared US and Mexico variants of multibenefit dentifrices toward reducing plaque metabolism in vitro. Methods: Plaque biofilms were prepared on glass rods (N=4/testgroup) with whole saliva spiked TSB as growth media. Following 3 days growth, plaque was treated a single time with 16.7% w/w dentifrice/water slurries for two minutes. Following rinsing, plaque was immersed in glycolysis media (TSB w/ 0.5% sucrose, pH 6.5) and incubated at 37°C until Bromocresol Purple/Chlorphenol Red added to the negative control changed color. Plaque metabolism was assessed post incubation by measuring pH. Dentifrices tested included: I: Crest® Regular Cavity Protection (neg. control); II: US Colgate® Cavity Protection; III: Mexico (MX) Colgate Total (CT)12 ProfessionalClean; IV: MX CT12 ProfessionalWhitening; V: MX CT12 Professional Sensitivity; VI: MX CT12 AdvancedFresh; VII: US CT CleanMint; VIII: MX CT12 WhiteningGel; IX: MX CT12 CleanMint; X: US Crest Pro-Health; XI: MX Crest Oral-B Pro-Salud. For broad spectrum antimicrobial activity, CT dentifrices are based on triclosan (TCS) while Crest ProHealth and Pro-Salud dentifrices use SnF2. Results: pH decrease in buffer (lower = more efficacy) for groups compared by a students t-test (p<0.05) and among groups by a one-way ANOVA with Tukey’s HSD post hoc test (p≤0.05).

INTRODUCTION

Dental plaque is a complex multi-organism biofilm, initially formed on dental enamel by the attachment of planktonic bacteria and containing a large number of different species of anaerobic and aerobic bacteria. Acidogenic bacteria present in plaque biofilm lower the plaque pH when exposed to sucrose. The effect of treatments on the glycolysis activity as measured by pH can be used to assess the broad-band anti-microbial effect of oral treatments. The in vitro plaque glycolysis model (iPGRM) is a technique in which plaque is grown from human saliva and treated with dentifrice slurries to determine antiglycolytic activity of treatments. The purpose of this technique is to provide a simple and quick method for determining if compounds have an influence on the metabolic pathways that plaque microorganisms utilize for the production of toxins that adversely affect tooth or gingival health. In particular, the model focuses on the production of organic acids.

MATERIALS AND METHODS

Biofilm Growth: Plaque biofilm growth was initiated by dipping polished glass rods overnight at 37°C into a medium consisting of pooled saliva/trypticase soy broth (TSB, 40% v/v). To establish biofilm on the rods, on the morning of the second day the medium was exchanged to a sucrose-rich broth and biofilm was changed again and biofilm was grown overnight in supplemented pooled saliva (10% (v/v) led fresh human saliva (60% v/v) and trypticase soy broth (TSB, 40% v/v) before biofilm was treated a single time with 16.7% w/w dentifrice/water slurries for two minutes. Treatment with dentifrice slurry (1:5) Glycolysis pH

RESULTS

Prevention of Acid by Single Exposure Treatment [pH] (smaller is better)

US Crest Cavity Prot. (NC) F 4.91 1.90 0.04 A
MX Colgate Max Prot. Anticaries F 5.22 1.59 0.06 B
MX CT 12 Pro Clean TCS 5.27 1.54 0.11 B C
MX CT 12 Pro Whitening TCS 5.32 1.50 0.14 B C
MX CT 12 Pro Sensitive TCS 5.35 1.46 0.04 C
MX CT 12 Adv. Fresh Gel TCS 5.36 1.46 0.10 B C
MX CT Clean Mint US TCS 5.37 1.45 0.12 C
MX CT 12 Whitening Gel TCS 5.37 1.44 0.11 C
MX CT 12 Clean Mint TCS 5.38 1.43 0.09 C
US Crest ProHealth SnF2 5.60 1.21 0.15 D
MX OralB Pro-Salud SnF2 5.71 1.10 0.03 D
US Crest Gumcare SnF2 5.90 0.91 0.11 E

*CT=Colgate Total

CONCLUSIONS

All antibacterial multibenefit dentifrices provided reductions in plaque glycolysis metabolism. TCS dentifrices were consistent in antimicrobial activity across variants and from US to Mexico variants. SnF2 dentifrices inhibited glycolysis significantly more than TCS dentifrices. US and Mexico variants of SnF2 showed comparable efficacy.

References:


Research presented at the 88th General Session of the IADR, July 14-17, 2010, Barcelona, Spain