

Comparative Antimicrobial Effects of SnF₂ and Baking Soda/Peroxide/NaF Dentifrices

A.C. Lanzalaco*, L.A. Bacca, M.S. Becus, M.S. Leusch

Procter & Gamble Co., Mason, OH, USA

ABSTRACT

A stannous fluoride dentifrice stabilized with sodium gluconate and stannous chloride has been shown to be clinically effective in reducing gingivitis (Perlich et. al., *J. Clin. Dent.*, VI:Spec. Issue, 1995). This dentifrice has also been shown to have significant effects on plaque glycolytic and regrowth activities (Liang et. al., *J. Dent. Res.*73:#508) presumably due to stannous fluoride's antimicrobial activity. In contrast, it is unclear whether the addition of baking soda and hydrogen peroxide to a dentifrice provides an antimicrobial effect. The objective of the present study was to compare the antimicrobial efficacy of the following commercially available dentifrices: Crest® Gum Care Paste (CGCP: Procter & Gamble Co., 0.454% SnF₂), Crest® Gum Care Gel (CGCG: Procter & Gamble Co., 0.454% SnF₂), Mentadent® Baking Soda/Peroxide (MNT: Chesebrough-Ponds, 0.243% NaF), and Advanced Formula Crest® (AFC: Procter & Gamble Co., 0.243% NaF). The study utilized 20 subjects in a 4x4 Latin Square crossover that was balanced for first order carryover effects. In this design, each subject served as his/her own control. Subjects brushed with each of the four dentifrices with at least a 48-hour washout period between the use of test products. Subjects refrained from all oral hygiene for approximately 12 hours before baseline samples were taken. Following a baseline sampling, subjects brushed with the test dentifrice as they normally would for 1 minute, followed by a brief water rinse. Additional bacterial samples were taken from the gingival tissue with a sterile cotton swab at 15, 60, and 120 minutes post-brushing. Total facultative anaerobic bacteria counts were evaluated. An ANOVA for a 4 period, 4 treatment crossover study was performed on the data generated. Reductions in total mean log bacteria counts from baseline at 15, 60, and 120 minutes post-treatment were: (a) CGCP: 1.96a, 1.89a, 1.48a; (b) CGCG: 1.75a, 1.69a, 1.55a; (c) MNT: 1.1b, 0.93b, 0.83b; (d) AFC: 1.1b, 0.93b, 0.78b (a>b, p<0.01). **These results show that at all post-brushing time points, gum surfaces treated with CGCP and CGCG had significantly less (p<0.01) total facultative anaerobic bacteria than surfaces treated with either MNT or AFC.**

INTRODUCTION

Research has demonstrated that stannous fluoride, in a stabilized dentifrice formulation, is clinically effective in the prevention of gingivitis and gingival bleeding. It has also been shown to effect plaque glycolytic and regrowth activities. Controversy exists concerning whether the combination of baking soda/peroxide has any effects on gum health. This study evaluated the antibacterial efficacy of two stannous fluoride dentifrices and a baking soda/peroxide dentifrice relative to a commercially available sodium fluoride dentifrice.

OBJECTIVE

The purpose of this study was to compare the antibacterial activity of three commercially available dentifrices containing either stannous fluoride or baking soda/peroxide to a commercially available sodium fluoride dentifrice.

MATERIALS AND METHODS

Products Tested

- Advanced Formula Crest® - 0.243% NaF (Procter & Gamble Company)
- Crest® Gum Care Paste - 0.454% SnF₂ (Procter & Gamble Company)
- Crest® Gum Care Gel - 0.454% SnF₂ (Procter & Gamble Company)
- Mentadent® Baking Soda/Peroxide - 0.243% NaF (Chesebrough-Ponds USA)

Experimental Methods

Entrance Criteria

Subjects were excluded if they were:

- Using antibiotics, chlorhexidine, or cold medication within 1 week of study dates
- Under care of a dentist or periodontist for cavities, gingivitis, or periodontitis

Study Design

Twenty subjects participated in this 4x4 Latin Square crossover designed study. Subjects refrained from brushing the evening before and the morning of the treatment days. On each treatment morning, a dental hygienist obtained a baseline bacterial sample from each subject by swabbing the gums adjacent to the gumline on both the upper and lower dentition (buccal and lingual surfaces). Subjects brushed under supervision with a premeasured sample of dentifrice for 1 minute followed by a 10 second rinse with a premeasured amount of water. Additional bacterial samples were taken in the same manner as above at 15, 60, and 120 minutes post-brushing. Subjects did not eat or drink during this 120 minute period. A minimum washout period of 48 hours was used between each treatment.

Microbial Sample/Data Collection

Upon completion of the sample collection, the swab was placed into a chilled vial containing 8 ml of Reduced Transport Fluid (RTF), and purged with nitrogen. The sample was vortexed, transferred to a sterile vial, and dispersed by sonication. One ml of sample was diluted with 9 ml of RTF, and 40µl of this dilution was plated on Trypticase Soy Agar plates using a spiral plater (Spiral Systems, Cinti., OH). Plates were then incubated anaerobically for 48 hours. Log (base 10) of the total facultative anaerobic bacteria counts per ml were taken and statistical analysis was performed.

Statistical Analysis

A 4x4 Latin Square design that was balanced for first order crossover effects was utilized for this study. In this design each subject served as his/her own control thus reducing the variability of the data. From the total facultative anaerobic bacteria counts, a change from baseline response for each subject at each visit could be calculated. A parametric analysis of variance (ANOVA) with models appropriate for the crossover design was performed on the change from baseline data.

RESULTS

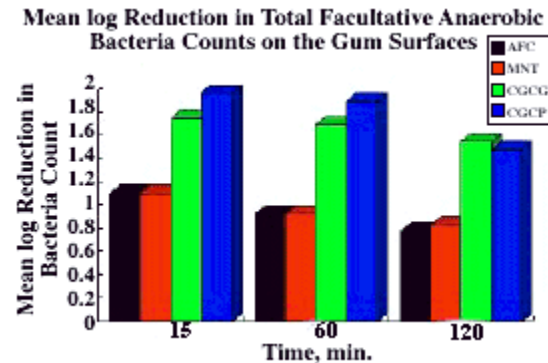
The effect of Crest[®] Gum Care paste and gel and Mentadent[®] Baking Soda/Peroxide on total facultative anaerobic bacteria found on gum surfaces was assessed. Each subject's baseline score served as his/her own control. The mean log change from baseline in total facultative anaerobic bacteria for each treatment is shown in Table 1 and Figure 1.

Table 1. Mean Log Bacteria Change from Baseline

Treatment	N	15 min.	60 min.	120 min.
Advanced Formula Crest	17	-1.1 (0.37)	-0.93 (0.44)	-0.78 (0.51)
Mentadent [®] Baking Soda/ Peroxide	20	-1.1 (0.32)	-0.93 (0.35)	-0.83 (0.53)
Crest Gum Care Gel	18	-1.75* (0.53)	-1.69* (0.46)	-1.55* (0.40)
Crest Gum Care Paste	19	-1.96* (0.47)	-1.89* (0.44)	-1.48* (0.51)

* denotes statistical significance vs. AF Crest and Mentadent[®]Baking Soda/Peroxide at p<0.01

Figure 1.



CONCLUSION

These results show that at all post-brushing time points, gum surfaces treated with Crest[®] Gum Care paste and Crest[®] Gum Care gel had significantly less (p<0.01) total facultative anaerobic bacteria than surfaces treated with either Mentadent[®] Baking Soda/Peroxide or Advanced Formula Crest[®]. Mentadent[®] Baking Soda/Peroxide was not statistically different from Advanced Formula Crest.