Changes in Pathogenicity of Gumline Plaque: 3 weeks CPC Rinse Treatment

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ABSTRACT

Objectives: Common oral diseases such as chronic adult gingivitis and periodontitis are a consequence of poor oral hygiene, leading to increased plaque mass at hard to reach places. The increase in plaque mass is also accompanied by changes in its composition due to community succession. The plaque microflora, initially dominated by streptococci and other gram positive species, shows increased proportions of gram negative species and obligate anaerobes, resulting in inflammation and tissue destruction. Mouth rinses containing antineutrophilic compounds are commonly used as an adjunct to tooth brushing to help control plaque growth. In this research we aim to monitor the effect of 0.07% CPC containing Crest Pro Health rinse on gumline plaque composition during 3 weeks usage.

Methods: A 7 weeks, 3 period, home use, intervention study was conducted using 12 subjects. Post 2 week acclimatization period with standard fluoride dentifrice, volunteers continued the usage of dentifrice for 2 weeks baseline period (week 3&4). Gumline plaque samples were collected once a week, by dental hygienist, prior to brushing in the morning. Intervention with a CPC containing rinse was introduced, post brushing twice a day for 3 weeks treatment period (week 5, 6 &7). Gumswab samples were collected 10hrs post 6th and 38th use of CPC rinse.

Samples were analysed for bacterial composition using a traditional culture technique. Results: A significant reduction in the percentage of Gram negative anaerobes GNA (Baseline GNA / total bacterial count ratio: 0.143±0.2, Treatment: 0.024± 0.045 post 38th rinse, p= 0.0001) was observed over the treatment period of 3 weeks. There was no cumulative treatment effect from week 1 to week 3 as well as no change in the percentage of streptococci species.

Conclusion: 3 weeks treatment with 0.07% CPC containing Crest Pro Health rinse has resulted in less pathogenic plaque composition over treatment period.

INTRODUCTION AND PURPOSE

The bacteria implicated in gingivitis are also present in the gingival crevice in health, but in low numbers. Hence it appears that gingivitis is not caused by microbial pathogens that have then primary habitat outside of the mouth but is associated with a shift in the balance of resident plaque microflora. As a result the aim of prophylactic oral hygiene measures used on daily basis should be to control plaque accumulation and composition, rather than to eliminate it.

CPC is a quartenary ammonium compound, commonly used in mouthrinses. The in-vivo efficacy of CPC mouth rinse depends on various factors such as its delivery in a bioavailable form, its interaction with salivary components and its retention in the oral cavity. This study aims to monitor the effect of a 0.07% high bioavailable, alcohol free CPC containing mouthrinse on gumline plaque composition during a 3 week usage.

RESULTS

In order to determine the number of viable cells in each of the samples, aliquots of serial dilutions were then spread on fastidious anaerobe agar (FAA) (Difco Laboratories, USA) with 5% Horse Blood for the total anaerobic counts; Wilkins Charlgren agar with anaerobe supplement (containing nalidixic acid and vancomycin) and 5% v/v Horse blood for the isolation of Gram-negative anaerobes (DNA, Mitis Salivarius agar (MSA) (Difco laboratories USA) for the total streptococcus species count. All plates were incubated in an anaerobic environment (10% carbon dioxide, 10% hydrogen and 80% Nitrogen, Macsva500 unit manufactured by Don Whitley Scientific, UK) at 37°C for 5 days, at which point the number of colony forming units (cfu) was determined.

<table>
<thead>
<tr>
<th>Study Week</th>
<th>Mean Visible Count (log10 Cfu/device ± SD)</th>
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<tbody>
<tr>
<td>Baseline Wk 3</td>
<td>FAA: 6.35 ± 0.57, GNA: 0.143, Total Streptococcus species count: 5.11 ± 0.92</td>
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<tr>
<td>Baseline Wk 4</td>
<td>FAA: 6.35 ± 0.41, GNA: 0.392, Total Streptococcus species count: 5.37 ± 0.87</td>
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<tr>
<td>Treatment Wk 5</td>
<td>FAA: 6.75 ± 0.34, GNA: 0.024, Total Streptococcus species count: 5.80 ± 0.51</td>
</tr>
<tr>
<td>Treatment Wk 7</td>
<td>FAA: 6.26 ± 0.43, GNA: 0.032, Total Streptococcus species count: 5.85 ± 0.85</td>
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Table 1: Bacterial count for gumline plaque samples over the baseline (week 3 and 4) and intervention period (week 5 and 7) with Crest Pro-Health.

CONCLUSION

Three week treatment with CPC containing mouth rinse resulted in a significant reduction in the percentage of gram negative anaerobes in gumline plaque samples, when sampled approximately 10-12 hrs post 38th rinse at night. At the same time the percentage of streptococci species (major component of oral micro flora in health) remained constant over the treatment period.

Key
- FAA: Fastidious anaerobe agar for total/facultative anaerobe count
- GNA: Gram negative anaerobe count
- Ratio data : Average scores with p-values based on non-parametric analyses.

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Use of 0.07% CPC rinse in addition to normal brushing may help stabilize the balance of the plaque microflora under conditions that may otherwise predispose site to gingivitis.

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