

## Effectiveness of Bromochlorophene on Gingival Health

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### ABSTRACT

The effect of a commercial toothpaste containing 0.2 % bromochlorophene (BCP) on established plaque and gingivitis was compared with placebo. The two toothpastes were similar in packaging, taste, consistency, and color. Thirty-two patients with chronic gingivitis were enrolled in this randomized, double-blind comparison and were asked to brush twice a day with the given toothpaste without changing their oral hygiene habits. Plaque index, gingival index, gingival crevicular fluid, and papillary bleeding index were recorded at baseline and after 3 weeks. Significant decreases in gingival and papillary bleeding indices were noted in the BCP group, as compared with the placebo group. Plaque index significantly decreased in both groups. No significant change was noted in the volume of gingival crevicular fluid.

**Keywords** : antiplaque agents; dental plaque; gingivitis

### INTRODUCTION

Bromochlorophene (BCP) is a 3,3'-dibromo-5,5'-dichloro-2,2'-dihydroxydiphenylmethane disinfectant that is well tolerated by skin and mucosa. Most gram-positive bacteria, specifically streptococci, staphylococci, *Corynebacterium*, and *Lactobacillus arabinosus*, are sensitive to this antiseptic. As a fungicide, BCP is less potent.

Experimental evidence indicates that the use of BCP in toothpaste is safe<sup>1</sup> with only slight irritation after contact with eyes and skin being reported. BCP is also used in mouth rinses and deodorants.

The mode of action of phenols against gram-positive and gram-negative bacteria depends on concentration. In high concentrations, phenols disrupt the cell wall and precipitate cell proteins. In lower concentrations, inactivation of enzymes occurs.<sup>2</sup> The present clinical trial studied the effect of a commercial brand of toothpaste containing 0.2 % BCP (Neospirodent®, Deprophar, Belgium) on established plaque and gingivitis in human patients.

### MATERIALS AND METHODS

Thirty-two patients (20 men and 12 women) participated in this study. All had at least five teeth per quadrant and no removable appliances. The patients had no relevant medical history and neither took antibiotics nor used mouthwashes 1 month prior to the beginning of this study. They had not received instructions on oral hygiene prior to study entry.

Patients were randomly assigned to the test or the control (placebo) group and received a coded kit containing a standard toothbrush and three white tubes of dentifrice. Dentifrices were closely matched with respect to packaging, color, taste, and consistency; the only difference was the presence or absence of BCP.

Participants were asked to brush twice a day, as usual, for 21 consecutive days, using only the assigned dentifrice and brush. After brushing, the dentifrice was to be kept in the mouth for 1 minute before rinsing. Thirty-one patients completed the study without loss of compliance. Plaque was assessed by means of the Silness and Loë index and gingival index by the Loë and Silness method; gingival crevicular fluid was measured with Periotron® (IDE Interstate, Amityville, NY).

Plaque and gingival indices were determined at mesial, buccal, distal, and lingual sites on Ramfjord teeth (11, 16, 24, 31, 36, 44). Gingival crevicular fluid was sampled on the buccal side of these teeth. The papillary bleeding index of Muhlemann was recorded on teeth 1 to 7 in each quadrant. Study participants were re-examined after 3 weeks.

## RESULTS

Mean values for each index were compared with Student's *t* test to determine whether differences between readings at baseline and after 3 weeks were statistically significant.

Overall Mean Indices at Baseline ( <i>t</i> = 0) and After 3 Weeks ( <i>t</i> = 21)							
	<i>t</i>	Control Mean	Control SD	<i>t</i> Test	BCP Mean	BCP SD	<i>t</i> Test
Plaque index	0	1,44	0,43	<i>P</i> < ,05	1,52	0,40	<i>P</i> = ,001
	21	1,27	2,11	<i>P</i> < ,05	1,11	1,43	<i>P</i> = ,001
Gingival index	0	1,30	0,44	NS	1,15	0,99	<i>P</i> < ,01
	21	1,23	1,74	NS	0,99	1,77	<i>P</i> < ,01
Gingival crevicular fluid	0	41,48	23,25	NS	37,99	18,58	NS
	21	33,49	98,46	NS	29,12	55,84	NS
Papillary bleeding index	0	1,54	0,85	NS	1,54	1,08	<i>P</i> < ,05
	21	1,56	3,41	NS	1,35	3,78	<i>P</i> < ,05

NS = not significant.

### Plaque Index

In the control group, plaque index at baseline was lower than in the BCP group; the opposite was noted for an other indices. In both groups, a significant reduction in plaque index occurred after 3 weeks. The reduction in the BCP group (*P* = .001) corresponded, on average, to a decrease of 26.9 % in plaque scores. A 15.1 % decrease in scores between groups was noted. The BCP contained in this dentifrice has a pronounced antiplaque effect, corresponding to the sensitivity of most gram-positive bacteria that comprise oral flora.

### Gingival Index

In the control group, the improvement in gingival index was not significant (*P* = .25). In the BCP group, a highly significant improvement (*P* = .006) indicated a positive effect in gingivitis control (average decrease of 13.9 %). The difference between test and control groups was 8.6 % after 3 weeks.

## **Gingival Crevicular Fluid**

Similar, though not significant, decreases occurred in both groups, but values fell within the standard deviation.

## **Papillary Bleeding Index**

Because gingival bleeding reflects histologic, clinical, and bacterial tissue alterations, an assessment of papillary bleeding on probing is a good way to evaluate gingival health. No improvement was recorded in the control group. This seems logical, as the patients did not use dental floss or proximal brushes. In the BCP group, however, the papillary bleeding index was significantly reduced ( $P = .02$ ). Even in the interproximal spaces, the antiseptic effect of BCP seemed noteworthy. Papillary bleeding scores decreased 12.3 % among BCP users, whereas no change occurred in the control group.

## **DISCUSSION**

Although experimental gingivitis trials offer a number of advantages, our goal was to study the therapeutic effect of a BCP-containing toothpaste on plaque and gingivitis in actual patients. The use of this toothpaste twice a day for 3 weeks caused highly significant reductions in pre-existing plaque, compared with a placebo dentifrice. That both groups achieved decreases in an indices can be explained by the "Hawthorne effect" (positive changes that occur in the behavior of subjects participating in an experiment<sup>3</sup>) and by anticipation of a forthcoming oral examination. In the control group, however, the improvement in periodontal conditions was slight and the reduction of plaque not sufficient to have a significant impact on gingival health. The BCP group demonstrated decreases in plaque scores as well as in gingival and papillary bleeding indices.

The antiplaque effects of chlorhexidine, triclosan, and sanguinarine have also been tested in toothpastes.

### **Chlorhexidine**

A 0.2 % chlorhexidine rinse was found to be most effective in reducing gingivitis and supragingival plaque in short-term studies.<sup>4</sup> Results from long-term clinical trials, however, were not impressive, compared with placebo.<sup>5</sup> Studying the effect of 2 years' use of a chlorhexidine-containing dentifrice on gingival status, Eriksen et al<sup>6</sup> found negligible differences between 0.4 % and 1 % concentrations. The results appeared to be due to good plaque control in both groups, although chlorhexidine may lose some properties when incorporated into dentifrices.<sup>7</sup> Chlorhexidine has an unpleasant taste and a tendency to stain the teeth but as a topically applied substance should have minimal side effects.

### **Triclosan**

The bisphenol triclosan, a 2,4,4' trichloro-2'-hydroxyphenyl-ether, is a nonionic germicide with low toxicity. Triclosan itself has a moderate plaque-inhibiting effect, but when combined with the copolymer vinylmethylether maleic acid (PVM/MA), its uptake to hard and soft tissues is clearly enhanced. Several reports of the antiplaque efficacy of 0.3 % triclosan in combination with 2 % PVM/MA have been published.<sup>8-10</sup> Palomo et al<sup>10</sup> found a significant reduction of 12 % in plaque formation after 4 and 6 weeks of use.

Lindhe et al<sup>11</sup> observed that the triclosan dentifrice produced a plaque reduction of 22 % after 6 weeks and an average decrease of 16 % in gingival scores in all areas of dentition. They suggested that triclosan PVM/MA may have a better effect on gingivitis than the one due to plaque reduction alone.

Extrinsic staining and unpleasant taste have not been reported with triclosan.

## Sanguinarine

Sanguinarine is a mixture of benzophenanthridine alkaloids obtained by alcoholic extraction of the blood root plant *Sanguinaria canadensis*. Sanguinarine exerts antimicrobial action against gram-positive and gram-negative bacteria by altering bacterial cell surfaces, including oral isolates,<sup>12</sup> so that attachment and aggregation are reduced.

Sanguinarine reportedly has better antiglycolytic effects on salivary bacteria than chlorhexidine.<sup>13</sup> In vivo clinical results of the antiplaque efficacy of mouth rinses with sanguinarine 300 µg/mL are equivocal. In two long-term (6-month) studies of a dentifrice containing 750 µg/mL of sanguinarine,<sup>14,15</sup> no significant reduction in plaque occurred. Only Lobbene et al<sup>14</sup> found an average reduction of 11.6 % in gingivitis. Significant reductions in plaque and gingival indices (26 % and 21 %, respectively) can be achieved when toothpastes and mouthwashes containing sanguinarine are used in combination.<sup>16</sup>

## CONCLUSIONS

Twice-daily use of a dentifrice containing 0.2 % BCP reduces supragingival plaque and gingivitis to a highly significant degree. Average reductions in plaque and gingival indices are comparable to those achieved with triclosan. Because many short-term studies frequently report an effect on plaque, the use of BCP-containing toothpaste warrants further long-term investigation.

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