Effectiveness of a Mouthwash Containing Triclosan and Gantrez® in the Reduction of Biofilm and Gingivitis: A Clinical Pilot Study

Roberto Andrade Acevedo, DDS, MDS, PhD; Lourdes Machón, DDS; Natália Chávez, DDS

Abstract

Aim: The aim of this pilot study was to evaluate the effectiveness of a mouthwash containing Triclosan and Gantrez in the reduction of bacterial biofilm and gingivitis.

Methods and Materials: Thirty patients were assigned to control and experimental groups. The visible plaque index and the marginal bleeding index were determined at the baseline, and at the second and third months, at which time a percentage of bacterial plaque and bleeding was obtained for each patient. All patients were given unlabeled toothpaste without Triclosan and Gantrez and soft-bristle toothbrushes. Additionally, the experimental group patients used unlabeled mouthwash with Triclosan and Gantrez. The participants were instructed to rinse for 60 seconds after brushing, twice a day.

Results: At the baseline, the control and experimental group’s bacterial plaque and marginal bleeding indices were close to each other (46.61% and 50.75% respectively; 7.62% and 9.59% respectively). At the third month, the experimental group presented bacterial plaque and marginal bleeding indices of 6.56% and 0.43% respectively, while the control presented 11.37% and 2.41% respectively. There were no significant differences between the two groups (p>0.05), with a discrete tendency to better results in the experimental group for both variables. However, there were significant differences among the experimental periods (p<0.05), except between the second and third months of observation.

Conclusions: The mouthwash did not bring forth an additional advantage when combined with brushing. Additional studies where the observation period may be prolonged and the number of subjects increased are recommended.

Clinical Significance: It is important to understand the role chemical control of supragingival plaque can play as an aid in the treatment of periodontal diseases. Since bacterial biofilm is the primary etiological factor in gingivitis and periodontitis, it is essential to know how to control it in order to provide a more complete therapeutic strategy for patient care.
Keywords: Bacterial biofilm, Triclosan, Gantrez, mouthwashes.


Introduction

Controlling the supra- and subgingival bacterial biofilm is vital in the process of stabilizing periodontal disease. In this context, scaling and root planning (SRP) are recognized as the “gold standard” procedures for periodontal treatment that frequently produces excellent clinical results. On the other hand, root instrumentation and bacterial biofilm control by a professional will have limited effects if these procedures are not followed by an efficient home maintenance program to achieve hygiene control by the patient. Besides regular brushing and the use of dental floss, chemical control through the use of toothpaste and mouthwashes provides an invaluable adjunct in controlling supragingival bacterial biofilm and calculus formation and in the treatment of gingivitis. Gunsolley shows the existence of strong evidence to support the antiplaque and antigingivitis effects of multiple chemical agents as a justification for their use as part of a typical oral hygiene regimen. Among the chemical compounds used for that purpose, some of the more common ones include the following:

- Cationic agents (Clorhexidine)
- Anionic (Fluor and sodium lauryl sulfate)
- Nonionic or phenolic substances (Triclosan)
- Combination of phenol and essential oils like thymol and eucalyptol (Listerine®), enzymes, sugar alcohols (Xylitol®)

In this context, Triclosan has received special attention since the 1980s by being incorporated into oral hygiene products as an abettor in the control of bacterial biofilm and demonstrating it is a safe agent. The addition of chemical compounds that increase Triclosan’s antibacterial substantivity or activity has improved its antiplaque action considerably. Two of the main substances used in combination with Triclosan are Zinc Citrate and Poly Methyl Vinyl Ether-co-maleic Anhydride (PVM/MA), commercially known as Gantrez®. Gantrez® together with Triclosan, has demonstrated the capacity for the reduction and prevention of bacterial biofilm formation in vitro by up to 45% during short periods of observation. Other investigators observed between 20 and 30% reductions in biofilm as well as the reduction of gingivitis during six-month experimental periods. Such a combination, unlike the effect of Triclosan by itself, increases its substantivity and retention in bacterial plaque, saliva, enamel, and oral epithelium.

Thus, the objective of this three-month pilot study was to demonstrate a Triclosan and Gantrez–based mouthwash, if used daily, would offer significantly better control of gingivitis and bacterial plaque. This pilot study would establish the basis for future clinical investigations involving a larger number of patients over a longer period of time in order to provide solid evidence to justify its use to control periodontal diseases of an inflammatory nature.

Methods and Materials

General Study Design

This study had a single center, randomized, parallel group design with 30 male and females included between the ages of 18 and 27 (average 19.6 years). All were dental students from the School of Dentistry at the Universidad Evangélica de El Salvador. They were all asked to submit
were replaced every month during the three-month experimental period. The control group participants brushed their teeth using their own personal techniques. In addition to using the unlabeled toothpaste, the experimental group of patients used unlabeled Plax® mouthwash with Triclosan and Gantrez® (Colgate Palmolive, New York, NY, USA). These participants were instructed to rinse for 60 seconds after brushing, twice a day. Plaque and marginal bleeding measurements were taken at the initial, second, and third months by a trained, calibrated evaluator with clinical experience in periodontics. The corresponding statistical analysis was performed using SPSS version 17.0 software (SPSS, Inc., Chicago, IL, USA).

Results

The initial VPI percentages (baseline) of the control and experimental groups were close, indicating the two groups were well balanced at the beginning of the study (46.61 and 50.74 respectively). There was a marked reduction of the plaque in both groups at the second month that was slightly higher in the control group than in the experimental group (11.91 and 14.68 respectively). At the third month, both groups continued to be effective with plaque control; nevertheless, the experimental group showed a higher tendency (better plaque control) than the control group (6.56 and 11.37 respectively) (Figure 1).

The UNIANOVA statistical test using the VPI as a dependent variable revealed when the treatments...
There was a significant statistical difference between the experimental periods 0 (baseline) and second month, 0 (baseline) and third month (p<0.05), but not between the second and third months (p>0.05). The initial average percentages (baseline) of the MBI revealed the control and experimental groups to be well balanced (7.62 and 9.59 respectively). The second month of observation showed findings similar to those seen with the plaque index. The third month showed a greater reduction of marginal bleeding in the experimental group in comparison to the control group (0.43 and 2.41 respectively) (Figure 2).

The UNIANOVA statistical test using the MBI as a dependent variable showed no significant statistical difference (p>0.05) when treatments are compared with the time variable. On the other hand, when time periods were compared, significant statistical differences between the groups were found (p<0.05). For this reason, an additional multiple comparisons test was done in order to identify where those differences lie and the nature of what their statistical significances might be.

There was a significant statistical difference between the experimental periods 0 (baseline) and the second month and 0 (baseline) and the third month (p<0.05). This was not the case between the second and third months (p>0.05). The linear regression analysis showed the values in both variables (VPI and MBI) were found to be dispersed at the baseline for both the control group as well as the experimental group. There is clear evidence of a prediction in the reduction of the values of the indexes throughout all of the experimental period for both groups. There was a perception of a marked decrease in the dispersion of the values and a discrete superiority in the experimental group at the second and third months (Figures 3 and 4).

**Discussion**

Triclosan has been widely used in a variety of consumption and health products. It has been demonstrated to be an efficient antiplaque agent, and since 1989, it has been considered a safe agent to be used in toothpastes and mouthwashes for daily use. A reduction of bacterial plaque of up to 33.99% has been observed at scarcely the fifth day after using.
Figure 3. Linear regression diagram for Visible Plaque Index (VPI) in relation to time.

Figure 4. Linear regression diagram for the Marginal Bleeding Index (MBI) variable in relation to time.
Experimental groups showed a significant reduction of bacterial plaque and marginal bleeding when compared to the baseline in all time periods. This finding indicates that brushing alone was as efficient as brushing associated with a mouthwash as no significant difference was found between groups (p>0.05). However, except between the second and third months, significant differences were observed in the different experimental periods when compared to the baseline, for both the VPI and the MBI (p<0.05). In spite of the significant difference between the groups, a higher tendency is perceived in the reduction of plaque and gingivitis in the experimental group (Figures 1 and 2). The regression analysis confirmed this tendency (Figures 3 and 4). As a result, it seems that a greater evaluation period is necessary, such as no less than six months, as suggested by Gunsolley.

This statement was supported by the analysis of Figures 1 and 2 where, at the second month of observation, the control group was slightly higher than the experimental group for both indices. However, at the third month of observation, the experimental group started to show a slightly superior level in the control of plaque as well as in gingivitis control. These findings confirm the hypothesis that a greater experimental evaluation period would be necessary to reinforce this tendency and verify if the experimental group shows a significant statistical superiority. It is essential to carefully evaluate the absence of significant statistics as this does not necessarily reflect the lack of clinical benefit. When the experimental group patients presented clinically greater cleanliness, they also showed an improvement in the clinical appearance of the periodontal tissue, as was confirmed by the clinicians in the study.

Conclusions

Taking into consideration the limitations inherent to the methodology used in this study, it can be concluded there was no statistical difference in the combination of brushing and the use of mouthrinse (Triclosan/Gantrez) versus brushing and not using the mouthrinse. Nevertheless, there is a tendency for better control of plaque and marginal bleeding when the combination of brushing and mouthwash was used. Therefore, future studies are needed to confirm, or not, such tendency by increasing the
experimentation period, by increasing the size of the study population, and by creating additional control groups.

Clinical Significance

It is important to understand the role chemical control of supragingival plaque can play as an aid in the treatment of periodontal diseases. Since bacterial biofilm is the primary etiological factor in gingivitis and periodontitis, it is essential to know how to control it in order to provide a more complete therapeutic strategy for patient care.

References


About the Authors

Roberto Andrade Acevedo, DDS, MDS, PhD
Dr. Andrade is a titular professor in the Department of Periodontics of the School of Dentistry at the Universidad Evangélica de El Salvador in San Salvador, El Salvador.
e-mail: acevedoroberto@hotmail.com

Lourdes Machón, DDS
Dr. Machón is a professor in the Department of Periodontics of the School of Dentistry at the Universidad Evangélica de El Salvador in San Salvador, El Salvador.
e-mail: lourdeshmachon@yahoo.com.mx

Natália Chávez, DDS
Dr. Chávez is an assistant clinical professor in the post-graduate program in the Department of Periodontics of the School of Dentistry at the Universidad Evangélica de El Salvador in San Salvador, El Salvador.
e-mail: nchavez@yahoo.com

Acknowledgements
The authors wish to express their appreciation to engineer Francisco Merino for his help with the statistical assessment.