

“Differences in antimicrobial activity of four commercial 0.12% chlorhexidine mouthrinse formulations: an *in vitro* contact test and salivary bacterial counts study

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J Clin Periodontol 2003; 30: 307-14.

BACKGROUND

Chlorhexidine (CHX) is the 'gold standard' antiseptic for its proven anti-plaque and anti-gingivitis effect. Its formulation is key due to its high reactivity and replacement of alcohol with other compounds could affect its activity

AIM

The objective of this study was to evaluate the antimicrobial activity of four different chlorhexidine mouthrinse formulations *in vitro* and *in vivo*.

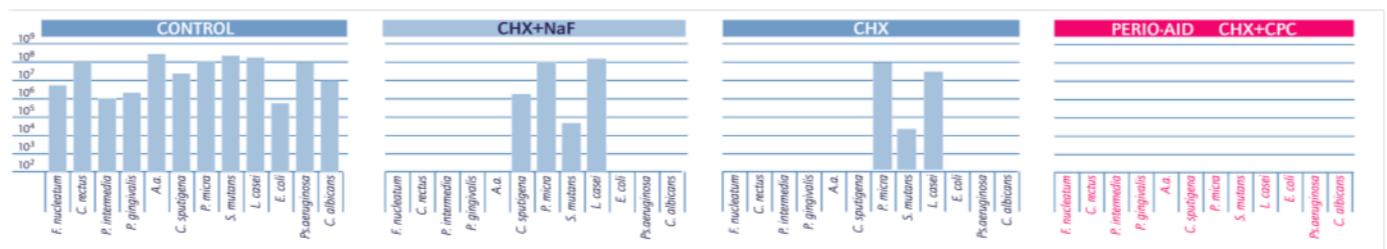
MATERIAL & METHODS

The four mouthrinses studied were: CHX 0.12% plus 5% alcohol (only mouthrinse with alcohol), CHX 0.12% plus cetylpyridinium chloride (CPC) 0.05%, a mouthrinse with only CHX 0.12% and another with CHX 0.12% plus sodium fluoride. In addition sterile saline was used as a negative control.

The *in vitro* study was a double contact test (SIKT) of the four mouthrinses and a negative control for 20 individual solutions from each of the most common health and disease oral bacterial species. The *in vivo* study was performed by making ten students rinse each product and taking saliva samples before and after 5 and 7 hours from the time of the rinses. In both studies bacterial counts were performed and the statistics were done with the results expressed in CFU.

RESULTS

For the *in vitro* study, all four chlorhexidine mouthrinses showed differences with the negative control, but only the chlorhexidine plus cetylpyridinium chloride combination showed a complete absence of bacterial resistance.



Similarly, for the *in vivo* study, all four mouthrinses with chlorhexidine showed differences with the negative control, and only mouthrinses with chlorhexidine plus alcohol and chlorhexidine plus cetylpyridinium chloride obtained better mortality rates for anaerobic bacteria during the first hours after their use.

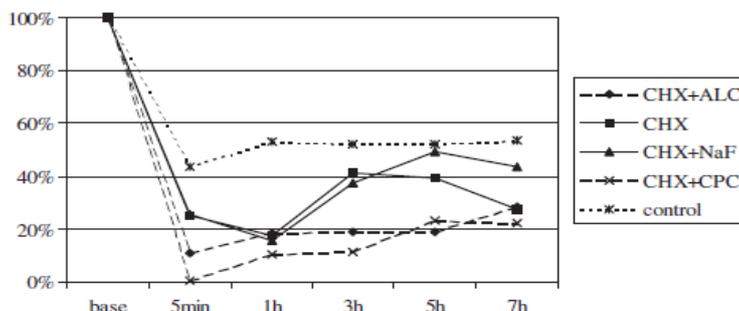


Fig. 2. Mean percentage of survival of anaerobic salivary bacteria at each sampling point and for each evaluated product.

CONCLUSIONS

Both *in vitro* and *in vivo* studies demonstrated that formulations containing chlorhexidine plus either alcohol or cetylpyridinium chloride, provided better results for microbiological control. Thus, it was concluded that the fact that a mouthrinse contains chlorhexidine is not sufficient to ensure its effectiveness, and the complete formulation of the product is a key factor. Considering that either eliminating alcohol or adding anionic compounds such as sodium fluoride, the activity is significantly decreased, the replacement of alcohol with cetylpyridinium chloride provides a safe and effective alternative for microbiological growth control of pathogenic biofilms in the oral cavity, and without the adverse effects that may result from using alcohol.

PRACTICAL IMPLICATIONS

This study demonstrated the importance of the formulation within a chlorhexidine mouthrinse to maximize its efficacy against oral pathogenic species