

'In vitro assessment of the antibacterial activity of three daily use mouthwashes with different active ingredients'

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INTRODUCTION

The overgrowth of periodontal pathogenic bacteria in the gingival sulcus is the main etiological factor of periodontal diseases. After the accumulation and the establishment of a pathogenic biofilm, the resulting inflammation, can lead to continuous bone resorption which confirms the development of periodontitis. So controlling bacterial loads in different oral niches seems key to avoiding the establishment of this subgingival pathogenic biofilm. In order to carry out this microbiological control, different molecules contained in antiseptic mouthwashes for daily use are used as an adjunct to daily tooth brushing. When the effectiveness of these molecules is tested in vitro, is usually performed on bacterial cultures in planktonic growth. However, the growth of microorganisms in the oral environment is mainly in the form of biofilms.

OBJECTIVE

This study aims to compare the antibacterial effect of 3 mouthwashes indicated for oral care, where the growth of oral bacteria was evaluated as either planktonic or by forming multispecies biofilms. Two mouthwashes were formulated with triclosan (TCL) 0,15 % and the other one with cetylpyridinium chloride (CPC) 0,05 %.

MATERIAL & METHODS

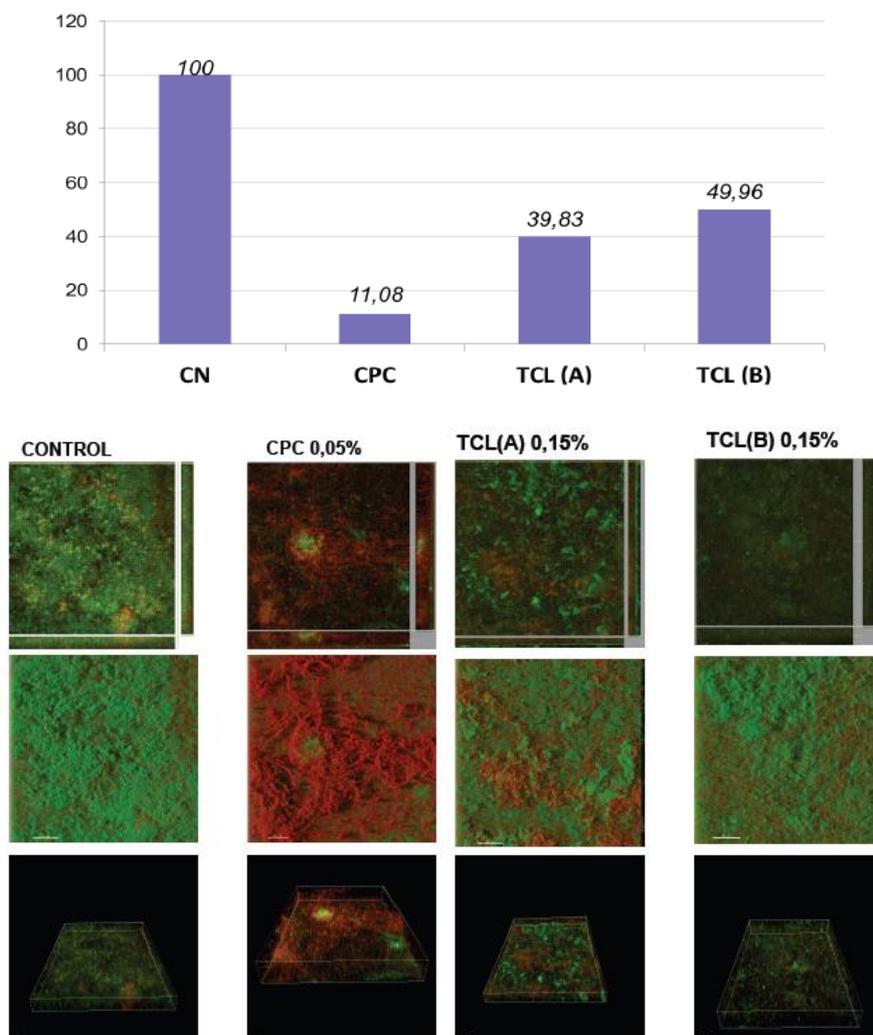
Single-species cultures of the following anaerobic bacteria were made: *Streptococcus Oralis*, *Actinomyces naeslundii*, *Veillonella parvula*, *Fusobacterium nucleatum*, *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans*. The antimicrobial activity of the mouthwashes using the Short Interval Killing Test (SIKT) method was assessed upon these cultures.

Also, multispecies biofilms were formed with six species on hydroxyapatite disks in anaerobiosis for 96 hours at 37°C. Mouthwashes treatments were performed for 2 minutes. Afterwards, the biofilms were mechanically disrupted for 5 minutes in 1 ml of phosphate buffered saline. The survival calculation was performed by counting viable colonies grown on blood agar plates and Dentaid-1. By Confocal Optic Microscopy bacterial mortality and antiseptic penetration in biofilms were assessed.

RESULTS

Regarding the single-species cultures, a total mortality significantly higher with the CPC mouthwash, which eliminated most bacterial cells, was observed. The other formulations caused a much lower mortality ($p < 0.05$). These results were also confirmed in the treatment of multispecies biofilms. Again, the 0,05 % CPC mouthwash caused a much higher mortality rate (% mortality: 88,92) to that achieved by formulations with 0,15% triclosan (% mortality: 60,17 and 50,04).

% SURVIVAL



CONCLUSIONS

The mouthwash formulated with 0,05% CPC, presented a greater bactericidal effect and a greater ability to penetrate the biofilm than those formulated with 0,15% triclosan.

PRACTICAL IMPLICATIONS

This *in vitro* study demonstrates that VITIS® gingival mouthwash exhibits a higher bactericidal effect and greater biofilm penetration than triclosan-based mouthwashes.