In Situ Antibacterial Activity of Essential Oils with and without Alcohol on Oral Biofilm: A Randomized Clinical Trial. Front. Microbiol. 8:2162. doi: 10.3

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Abstract Currently, there is little evidence on the in situ antibacterial activity of essential oils (EO) without alcohol. This study aimed to evaluate in situ the substantivity and antiplaque effect on the plaque-like biofilm (PL-biofilm) of two solutions, a traditional formulation that contains EO with alcohol (T-EO) and an alcohol-free formulation of EO (Af-EO). Eighteen healthy adults performed a single mouthwash of: T-EO, Af-EO, and sterile water (WATER) after wearing an individualized disk-holding splint for 2 days. The bacterial viability (BV) and thickness of the PL-biofilm were quantified at baseline, 30 s, and 1, 3, 5, and 7 h post-rinsing (Test 1). Subsequently, each volunteer wore the splint for 4 days, applying two daily mouthwashes of: T-EO, Af-EO, and WATER. The BV, thickness, and covering grade (CG) of the PL-biofilm were quantified (Test 2). Samples were analyzed by confocal laser scanning microscopy after staining with the LIVE/DEAD® BacLightTM solution. To conduct the computations of the BV automatically, a Matlab toolbox called Dentius Biofilm was developed. In test 1, both EO antiseptics had a similar antibacterial effect, reducing BV after a single rinse compared to the WATER, and keeping it below baseline levels up to 7 h post-rinse (p < 0.001). The thickness of the PL-biofilm after rinsing was not affected by any of the formulations and ranged from 18 to 24μm. After 4 days, the T-EO and Af-EO solutions were significantly more effective than the WATER, reducing the BV, thickness, and CG of the PL-biofilm. Although, both EO antiseptics presented a similar bactericidal activity, the Af-EO rinses led to more significant reductions in the thickness and CG of the PL-biofilm than the T-EO rinses (thickness = 9.92 vs. 7.90μm, P = 0.012; CG = 46.61 vs. 33.36%, P < 0.016). In conclusion, both EO antiseptics had very high immediate antibacterial activity and substantivity in situ on the 2-day PL-biofilm after a single mouthwash. In the 4-day PL-biofilm, both essential oil formulations demonstrated a very good antiplaque effect in situ, although the alcohol-free formula performed better at reducing the biofilm thickness and covering grade.

Palavras chave anti-infective agents, local, biofilm, dental plaque, essential oils, microscopy, fluorescence
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