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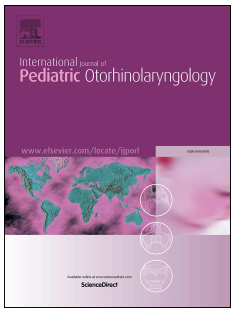

Lugol's solution eradicates *Staphylococcus aureus* biofilm in vitro

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ABSTRACT

Objectives

The aim of the study was to evaluate the antibacterial efficacy of Lugol's solution, acetic acid, and boric acid against *Staphylococcus aureus* biofilm.

Methods

The efficacy of Lugol´s solution 1%, 0.1%, and 0.05%, acetic acid 5% or boric acid 4.7% for treatment of *Staphylococcus aureus* biofilm in vitro was tested using 30 clinical strains. Susceptibility in the planktonic state was assessed by disk diffusion test. Antiseptic effect on bacteria in biofilm was evaluated by using a Biofilm-oriented antiseptic test (BOAT) based on metabolic activity, a biofilm bactericidal test based on culturing of surviving bacteria and confocal laser scanning microscopy combined with LIVE/DEAD staining.

Results

In the planktonic state, all tested *S. aureus* strains were susceptible to Lugol's solution and acetic acid, while 27 out of 30 tested strains were susceptible to boric acid. In biofilm the metabolic activity was significantly reduced following exposure to Lugol's solution and 5% acetic acid, while boric acid exposure led to no significant changes in metabolic activities. In biofilm, biocidal activity was observed for Lugol`s solution 1% (30/30), 0.1% (30/30), and 0.05% (26/30). Acetic acid and boric acid showed no bactericidal activity in this test. Confocal laser scanning microscopy, assessed in 4/30 strains, revealed significantly fewer viable biofilm bacteria with Lugol`s solution (1% $p<0.001$, 0.1% $p=0.001$ or 0.05% $p=0.001$), acetic acid 5% for 10 minutes ($p=0.001$) or 30 minutes ($p=0.015$), but not for acetic acid for 1 minute or boric acid.

Conclusion