Suppression of Mixed Candida Biofilms with an Iodine Oral Rinse

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ABSTRACT

Objective: The purpose of this study was to evaluate the effectiveness of oral candidiasis treatments in inhibiting metabolic activities of yeast cells in mixed biofilms formed by C. albicans and C. glabrata. The products tested included four concentrations of an iodine-based oral rinse (iodine), chlorhexidine gluconate and fluconazole.

Methods: C. albicans SC5314 and C. glabrata CBS138 were propagated to 1x10⁶ cells/ml. Mixtures of C. albicans to C. glabrata were prepared in the following ratios: 100:0; 99:1; 67:33; 33:67; and 0:100. One-tenth ml of each suspension was added per well in 96 well microtiter plates that were incubated at 37°C for 24hr to allow for biofilm formation. The following treatments were added to groups of 8 wells: oral rinse formulations (0.01%, 0.05%, 0.07%, or 0.1% iodine), placebo oral rinse (no iodine), PBS (cell control), chlorhexidine gluconate oral rinse (0.12%) or fluconazole (10mg/mL oral suspension). Exposure time of each challenge was 60 sec at 22°C. Metabolic activity was determined via XTT reduction assay.

RESULTS (continued)

One-tenth ml of each suspension was added per well in 96 well microtiter plates that were incubated at 37°C for 24hr to allow for biofilm formation.

Biofilm formation was confirmed by microscopic observation with an inverted microscope at 40X in all cases, except C. glabrata alone, which did not form a biofilm under these conditions, but did grow as a large macrocolony.

After washing each biofilm culture three times with 0.1ml of PBS, 0.1ml of PBS was added to each culture. To start the test, 0.1ml of the iodine-based formulations containing 0.01%, 0.05%, 0.07%, or 0.1% iodine, placebo oral rinse (no iodine), PBS (cell control), chlorhexidine gluconate oral rinse (0.12%) or fluconazole (10mg/mL oral suspension) was added to groups of 8 samples per treatment. Exposure time of each challenge was 60 sec at 22°C. To block further action of iodine at the end of 60 sec, 25 μl of 0.1N sodium thiosulfate was added to all samples containing iodine formulations.

Cultures exposed to the iodine-less vehicle, PBS, chlorhexidine or fluconazole were diluted with 100 μl of PBS. All fluids were then removed, the biofilm tissues were washed twice with PBS, 0.1ml of XTT reagent was added and the plates were incubated at 37°C for 2hr in the dark and the XTT assay was completed as described by Ramage et al.

Data analysis was performed using a two-way ANOVA with pairwise multiple comparisons.

Inhibition of Metabolic Activities of Mixed Candida Biofilm

REFERENCE


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