Controlling bacterial opportunistic pathogen contamination in DUWLs using Citrisil

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Purpose: The purpose of this study was to evaluate the efficacy of Citrisil tablets in controlling opportunistic pathogenic microbial contamination in dental tubing and potential biofilm removal using the standard dental unit waterline biocide testing model.

Materials and Methods: Regular polyurethane dental tubing (Freeman Manufacture Inc. Newberg) was used. Test materials were: Citrisil daily tablets (CDT), Citrisil Enhanced Orange Shock Cleaner (CEOSC), Aseptisil-liquid and Aseptisil-powder (Sterisil, Inc. Palmer Lake, CO). Sterilex (Sterilex Co. Owings Mills, MD) served as the control during the shock treatment. A two-species inoculum, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae,* was used to inoculate the dental tubing for 8-hour per day. Experiments were conducted using a standard dental unit waterline biocide test apparatus and methodology as proposed by the ADA Standards Committee on Dental Products. The study duration was four-weeks. Three-overnight shock treatments were performed using the tubing with accumulated biofilm over the 4-week period. The effect of the test materials was evaluated using effluent planktonic microbial counts (colony forming units (CFU)/mL), biofilm total viable counts (TVC), and scanning electron microscopy (SEM).

Results: The CDT eradicated $1X10^5$ CFU/mL from the inocula throughout the 4-week period. The TVC data showed statistical differences between control and citrisil group (p=0.003). CEOSC, Aseptisil-liquid and Aseptisil-powder effectively eradicated all the planktonic cells from tubing effluent and TVC from the biofilm during three consecutive overnight shock treatments. The test results were compatible with the Sterilex, which has the ADA acceptance seal. A single 10-minute treatment with either Aseptisil-liquid or Aseptisil-powder was able to kill all planktonic bacteria from contaminated dental tubing.

Conclusion: The daily use of CDT effectively controls opportunistic pathogenic microbial contamination in dental tubing. The CEOSC, Aseptisil-liquid and Aseptisil-powder inactivate biofilm and keep the dental tubing free from opportunistic pathogenic microbial contamination.

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