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Original Articles

In Vitro Antibacterial and Cytotoxicity Assessments of an Orthodontic Bonding Agent Containing Benzalkonium Chloride

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Abstract

Objective: To assess the antibacterial activity and cytotoxicity of an orthodontic bonding material containing an antibacterial agent.

Materials and Methods: Superbond C&B (4-methacryloxyethyl trimellitate anhydride/methyl methacrylate-tri-*n*-butyl borane [4-META/MMA-TBB]) resin was mixed with benzalkonium chloride (BAC) to obtain final BAC concentrations of 0.25%, 0.75%, 1.25%, 1.75%, 2.5%, and 5.0% (wt/wt). Antibacterial activity against *Streptococcus mutans* and *Streptococcus sobrinus* was evaluated by soaking the BAC-resin in distilled water at 37°C for periods of 30, 90, and 180 days. Antibacterial activity of the BAC-resin was measured by the disk diffusion method, and the inhibition zone around each sample was measured and recorded. For evaluation of cytotoxicity, BAC-resin samples were put into cell culture inserts placed above human gingival cells and were incubated at 37°C for 1, 3, and 6 days. Cytotoxicity was assessed with a tetrazolium bromide reduction assay.

Results: The antibacterial activity of BAC-incorporated resin samples decreased significantly after immersion in water for 180 days, regardless of BAC concentration. The antibacterial activity of nonimmersed resin containing 0.25% or 1.75% BAC was comparable with that of 5.0% BAC-resin immersed for 180 days. In cytotoxicity tests, most cells died when exposed to resins containing 1.75%, 2.5%, and 5% BAC. No difference was observed between resins containing 0.25% and 0.75% BAC at 1, 3, and 6 days of culture.

Conclusions: The addition of BAC to 4-META/MMA-TBB resin confers an antibacterial effect even after immersion in water, and 4-META/MMA-TBB resin containing 0.25% to 0.75% BAC has no significant cytotoxic effect.

Keywords: [4-META/MMA-TBB resin](#), [Benzalkonium chloride](#), [Antibacterial activity](#), [Cytotoxicity](#)

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