TITLE: COMPARABLE ANTIMICROBIAL PROPERTIES OF RESIN-MODIFIED GLASS-IONOMERS WITH NANO-SIZED PARTICLES OF SILANIZED SILICA

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ABSTRACT:

Glass ionomer cements are a class of biomaterial in widespread use in modern dentistry because of their biocompatibility and cariostatic properties. However, this cement presents disadvantages in mechanical, wear and resorption properties. Therefore, to overcome these limitations, it was proposed to incorporate silanized silica nanoparticles within the resin-modified glass ionomer cements (RMGI). The aim of this study was to evaluate the effect of incorporating these nanoparticles on antimicrobial properties and biofilm inhibition of RMGI. Nanoparticles were synthesized by the reverse microemulsion method and silanized with γ-chloropropiltrimethoxisilano (γ-CPTMS). The antimicrobial activity against *Streptococcus mutans* UA159 was assessed by the agar diffusion test using commercial RMGI with unmodified cement (control group – 0%) and modified cement with nanoparticles in the proportions of 1% and 5%. To assess biofilm inhibition, *S. mutans* biofilms were formed on discs prepared with RMGI in the same proportions. Three day biofilms were generated on composite discs using 24-well plates. Biofilms were grown at 37°C and media (1 mL BHI containing 0.5% sucrose) were changed every 24 hours. At the end of the third day, the viable cells were counted. Groups were statistically compared to each other. The modified cement with silanized silica nanoparticles exhibited the same inhibition halos on *S. mutans* as the control. In biofilm formation tests, a reduction in bacterial counts was not observed in any nanoparticle-containing composites compared with their unmodified counterpart. The addition of silanized silica (1–5 wt. %) nanoparticles to RMGI powder did not modify the antibacterial activity of the glass ionomer. These results show that the incorporation of silanized silica nanoparticles does not affect antimicrobial properties and biofilm inhibition capacity of resin-modified glass ionomer cements.

Keywords: *S. mutans;* biofilm, nanoparticles, antimicrobial properties

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