TITLE: DETERMINATION OF BIOFILMS INHIBITION USING ZINC OXIDE NANOPARTICLES INCORPORATED TO ORTHODONTIC RESIN

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ABSTRACT

Nanomaterials have unique properties when compared to their equivalents. Zinc oxide has an antimicrobial characteristic against pathogenic bacteria, such as *Streptococcus mutans*, bacteria from oral microbiota that has a key role in the pathogenesis of dental caries. Studies have shown that resin compounds tend to increase the bacteria accumulation, thus being a facilitator for the formation of bacteria aggregates (biofilms). The aim of this research was to conduct an in vitro study to evaluate the inhibition potential of biofilm formation in nanohybrid discs of zinc oxide. The nanoparticles were synthesized by the inverse microemulsion method, two groups being evaluated, one group functionalized with APTS (aminopropyltriethoxysilane) and one non-functionalized group. Unmodified resin *(Transbond™ XT, 3M, Monrovia, California, USA)* was used (control group – 0%) and modified resin with nanoparticles in proportions of 1%, 5% and 10%. The biofilms were cultured at 37ºC in 5% CO^2 in media containing 1 ml of BHI (*Brain Heart Infusion, Difco Co, Detroid, MI,USA)* with 0.5% sucrose, being changed every 24 hours. Inhibition of adherence against *Streptococcus mutans* UA159 was analyzed by comparing the amount of adhered cells on each disc in their different proportions of zinc oxide nanoparticles with the amount of cells adhered to the test specimens considered controls of bacterial growth. The group of functionalized nanoparticles containing 10% of zinc oxide presented a significant difference when compared to the control group. The other percentages, 1% and 5%, have not presented any activity. The group of non-functionalized nanoparticles has not showed activity in any of the proportions. The inhibition of biofilm formation obtained a greater effectiveness in the functionalized group in a proportion of 10% zinc oxide nanoparticle, when compared to the control group, thus suggesting that the functionalized nanoparticle allowed the decrease of bacteria adhesion of the and that the concentration used Of the APTS may have aided the nanoparticle interaction with the resin, leading to interfere in the adhesion and biofilm formation processes.

Keywords: Biofilms, Nanoparticles, *Streptococcus mutans*, Zinc oxide.

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