

Activity of chlorhexidine formulations on oral microorganisms and periodontal ligament fibroblasts

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Abstract

Given the importance of microorganisms in the pathogenesis of the two most prevalent oral diseases (i.e. caries and periodontitis), antiseptics are widely used. Among the antiseptics chlorhexidine (CHX) is still considered a gold standard. The purpose of this in-vitro-study was to determine the antimicrobial activity of new CHX digluconate-containing formulations produced in Switzerland. Two test formulations, with 0.1% or 0.2% CHX (TestCHX0.1, TestCHX0.2) were compared with 0.1% and 0.2% CHX digluconate solutions (CHXph0.1, CHXph0.2) without additives and with a commercially available formulation containing 0.2% CHX digluconate (CHXcom0.2). The minimal inhibitory concentrations (MIC) of the CHX formulations were determined against bacteria associated with caries or periodontal disease. Then the anti-biofilm activities of CHX preparations were tested regarding inhibition of biofilm formation or against an existing biofilm. Further, the cytotoxicity of the CHX preparations against periodontal ligament (PDL) fibroblasts was measured. There were no or only minor differences of the MIC values between the CHX preparations. Except for 0.1% CHXph, all formulations blocked the formation of the biofilms. When analyzing the effect on an established "cariogenic" biofilm, the TestCHX0.2 was most active (-3.5 log₁₀ colony forming units (cfu); p<0.001 vs. control). The cfu counts of an established periodontal biofilm were most decreased by CHXcom0.2 (-3.9 log₁₀), followed by TestCHX0.2 (-3.34 log₁₀) and CHXph0.2 (-3.0 log₁₀ cfu) (each p<0.001 vs. control). All CHX preparations reduced the viability of the PDL fibroblasts. Taken together, the Swiss made test mouth rinses have an equal or better antibacterial and anti-biofilm activity as the respective CHX solutions and can be recommended.