

Title: ANTIMICROBIAL ACTIVITY OF CHITOSAN/GELATIN/COPAIBA OIL EMULSION AGAINST *Staphylococcus aureus*

Authors Marangon, C. A. ¹, Martins, V. C. A. ¹, Nitschke, M. ¹, Plepis, A. M. G. ¹

Institution ¹ PPGIB/IQSC - USP – Universidade de São Paulo (Avenida Trabalhador São-carlense, 400 - Parque Arnold Schimidt – 13.560-970 - São Carlos/ SP)

Abstract:

Antimicrobial resistance has become an important and growing public health problem worldwide and new solutions are needed. Studies with polymers and essential oils have attracted great interest for applications in this area. In this study, the antimicrobial activity of copaiba oil, chitosan/gelatin gel (CG) and chitosan/gelatin/copaiba oil emulsion (CGCO) was evaluated against *Staphylococcus aureus* ATCC 25923. Chitosan was obtained from squid pens by desmineralization, desproteinization and deacetylation and a 2% solution was prepared in 1% acetic acid. A 2% gelatin gel was obtained by dissolution of commercial gelatin (Sigma) in water and gelatinized at 60°C for 30 min. CG gel and CGCO emulsion were prepared by mixing chitosan and gelatin gels at 2:1 (w/w) ratio under constant stirring. The concentration of CGCO emulsion was adjusted according to the minimum inhibitory concentration (MIC) for CG gel and oil separately. MIC and minimum bactericidal concentrations (MBC) with oil, CG gel and CGCO emulsion were determined using the micro-broth dilution technique. The cytotoxicity effect of compounds on VERO cell line was also evaluated using the MTT assay. Copaiba oil inhibited bacterial growth showing a MIC and MBC of 500 µg mL⁻¹ whereas for CG gel it was observed a MIC and MBC of 31.2 µg mL⁻¹. These results demonstrate the bactericidal activity of both compounds against *S. aureus*. The combined emulsion (CGCO) showed the same MIC and MBC values as those obtained for the isolated compounds, suggesting lack of synergistic effect. The CG gel and the CGCO emulsion did not show toxicity to VERO cells, while the copaiba oil it was cytotoxic. Therefore, the results of this study demonstrated that the combination of CGCO may be a potential source for the development of a new selective antimicrobial agent to control this important bacterial pathogen.

Keywords: chitosan, gelatin, copaiba oil, *Staphylococcus aureus*

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