

TITLE: ANTIMICROBIAL ACTIVITY OF BUFFALO SERUM WITH SILVER NANOPARTICLES

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ABSTRACT:

The Center for the Study of Venoms and Venomous Animals researches and develops fibrin sealant, a promising agent for treating venous ulcers. The sealant consists of fibrinogen extracted from buffaloes and an enzyme obtained from snake venom. Since ulcers are frequently colonized and /or infected, a study was begun for the incorporation of an antimicrobial agent into the sealant composition. The objective of this work was to verify the antimicrobial activity of the silver nanoparticles incorporated in the buffalo serum. Silver nanoparticles coated with serum-functionalized chitosan were prepared. Size: 170 nm, z potential: 11 mv and concentration of 4.3 µg/ml. Four strains of *Staphylococcus aureus* and four *Escherichia coli* strains were used in the antibacterial test. For the antifungal test, eight different *Candida* isolates (*C. krusei*, *C. parapsilosis*, *C. guilliermondii*, *C. metapsilosis* and three *C. albicans*) were tested. The microdilution method was used in Mueller Hinton Broth broth (bacteria) or in RPMI-1640 broth supplemented with 2% glucose (fungi) in order to obtain broths with different product concentrations (2.15 to 0.214 µg/ml). Besides the assay only in culture medium and product (negative control) and medium and microorganisms (positive control). A standard inoculum was added and the material was incubated. The minimum inhibitory concentration (MIC) was the lowest concentration of product inhibiting the growth of the microorganisms. Broth aliquots were seeded onto solid medium plates and incubated. The absence of colony growth on the plaques determined the minimal bactericidal concentration and the minimum fungicidal concentration. All experiments were performed in duplicate. The MIC varied from 0.96 to 2.15 µg/ml for bacteria. Silver nanoparticles coated with serum-functionalized chitosan have antimicrobial activity as demonstrated in the tests with *Staphylococcus aureus*, *Escherichia coli* and *Candida* spp. Concentrations capable of killing these microorganisms were often greater than or equal to MIC. This was the first step in the development of a new fibrin sealant. Besides being an adjuvant in the treatment of ulcers, it may also contain an antimicrobial agent that may contribute to the improvement of the patient.

Keywords: silver nanoparticles, antimicrobial, bioproduct, venous ulcers, healing

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