

TITLE: ANTIMICROBIAL ACTIVITY OF PURIFIED AND NANOENCAPULATED USNIC ACID ON ISOLATES OF OXACILLIN-RESISTANT *Staphylococcus* spp.

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ABSTRACT

Pyodermatites are bacterial infections of the integumentary apparatus, closely associated with the penetration of the natural microbiota, with emphasis on the genus *Staphylococcus*, whether resident or transient, on injured skin. Antibiotic therapy, the treatment of choice for the control of these infections, revealed the emergence of multidrug resistant microorganisms, which represents a major obstacle to conventional treatment. In this context, the search for principles of natural origin, such as usnic acid, represents a promising alternative in the control of the dissemination of multidrug resistant microorganisms. Joining the employment of nanotechnology has been tested as a potentiator of the therapeutic effects of antimicrobials. This study aimed to evaluate in vitro antimicrobial activity of purified and nanoencapsulated organic acid against oxacillin-resistant *Staphylococcus* spp. originated from canine and feline otitis. Twelve isolates of *Staphylococcus* spp. (otitis and pyodermatites) derived from dogs and cats from the collection of the Laboratory of Microbiology and Animal Immunology of UNIVASF (Petrolina / PE) were used. Initially, the resistance profile of each isolate to oxacillin was evaluated. Then it was prepared a solution of 1 mg / mL of usnic acid (AU) diluted in distilled water with 1% DMSO (dimethylsulfoxide) and nanoencapsulated usnic acid (NUA) at a concentration of 2.76 mg/mL. A MIC (Minimum Inhibitory Concentration) and a MBC (Minimum Bactericidal Concentration) were found from the modified method of the Clinical and Laboratory Standards Institute. Usnic acid (UA) showed MIC ranging from 0.78 to 41.67 ± 8.33 $\mu\text{g} / \text{mL}$ and MBC from 4.17 ± 1.04 to 133.33 ± 33.33 $\mu\text{g} / \text{mL}$. NUA was more effective than UA, reducing by up to 79.98% and 99.13%, the bacteriostatic and bactericidal effect, respectively, due to the acquisition of new physical-chemical properties in the nanoencapsulation process. The results indicate that the usnic acid is a viable alternative to be used in the topical therapy of pyodermatites and otitis because it has antimicrobial activity in low concentrations, demonstrating the potential effect of phytotherapy and nanotechnology in the control of infections caused by multidrug resistant microorganisms.

Keywords: Pyodermatitis; otitis; Microbiology; Multiresistance; Nanotechnology.

Development Agencies: CNPq.