

TITLE: ANTIMICROBIAL ACTIVITY OF PURIFIED AND NANOENCAULATED USNIC ACID AGAINST ISOLATED OF *Staphylococcus* spp. OF EQUIDAE WOUNDS

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ABSTRACT

Equines are strongly susceptible individuals to skin traumas as it naturally exhibits explosive behavior as well as develops predisposing physical activities to injuries. Skin injuries present a high risk of infection, especially with opportunistic microorganisms of the skin like *Staphylococcus* spp. The use of natural compounds represents new alternatives in the control of infections. Usnic acid is a substance extracted from a lichen, *Cladonia substellata* Vainio, with anti-inflammatory, antimicrobial and cicatricial potentials, and it has aroused the interest of research groups. The objective of this study was to determine in vitro the antimicrobial activity of purified and nanoencapsulated usnic acid against *Staphylococcus* spp. from equidae wounds. Five clinical isolates and two standard strains (ATCC 25923 and ATCC 33591) were used. Then, the standardization test was carried out to obtain a relationship between Colony Forming Units (CFU) and Optical Density (OD). Each test was performed in biological triplicate and duplicate technique. For the MIC (Minimum Inhibitory Concentration) and MBC (Minimum Bactericidal Concentration), it was then prepared a solution of 1mg / mL of usnic acid (UA) diluted in distilled water with 1% DMSO (dimethylsulfoxide) and nanoencapsulated usnic acid (NUA) at a concentration of 1mg/mL. The substances were tested according to the modified method of the Clinical and Laboratory Standards Institute. In view of this, it was possible to observe that the isolates together with the standard strains had similar growth profiles (3.19×10^9 CFU / mL). The mean values of MIC were $(40.48 \pm 9.58 \mu\text{g} / \text{mL})$ and MBC $(50.19 \pm 8.66 \mu\text{g} / \text{mL})$ of UA. NUA showed to be more effective than the UA, reducing the MIC and CBM values by 78.68% and 80.23%, respectively, due to increased membrane permeability and exposure time of the nanoencapsulated compound. The results indicate that usnic acid represents a promising alternative for the control of Equidae infections, especially on its antimicrobial effect. In addition, nanotechnology can contribute to improving the potential effects of usnic acid.

Keywords: Biocomposites; Infection; Lichens; Microbiology; Nanotechnology.

Development Agencies: CNPq.