

TITLE: *IN VITRO* EVALUATION OF THE ANTIBACTERIAL ACTIVITY OF AMMONIACAL NIOBIUM OXALATE BY DIFFERENT MICROBIOLOGICAL TECHNIQUES

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Scientific advances related to the application of niobium (Nb) have been extensive since its discovery. Brazil is the largest producer of the metal, representing more than 95% of the world total. Its antimicrobial activity has already been proven, however the study and development of new formulations can favor the expansion of its use in the health area. The aim of this research was to evaluate the *in vitro* antibacterial activity of ammoniacal niobium oxalate (ANO) by two different microbiological techniques against standard bacteria: *Staphylococcus aureus* (ATCC 6538), *Methicillin-resistant Staphylococcus aureus* (ATCC 43300) – MRSA and *Escherichia coli* (ATCC 25922). For the double-layer agar diffusion well technique was performed in triplicate, Petri dishes (90x15mm) with two layers of Muller Hinton Agar: base (12mL) and seed [8mL+standardized bacterial inoculum (10⁶UFC/mL)] were used. After solidification of the culture medium, wells with a diameter of 3mm were made with sterilized straws and 20µL of ANO at 20 and 100% were added inside them. The plates were pre-incubated at room temperature for 2h and then incubated at 37°C for 24h. The technique for determining the maximum inhibitory dilution (MID) was performed in quintuplicate by microdilution in 96-well U-bottom polystyrene microplates with a final volume of 100µL of Mueller Hinton Broth+ ANO 50%+5µL of standardized bacterial inoculum (10⁶UFC/ml) per well. Doubling dilutions of the ANO were carried out from 250 to 0,03mg/mL. Furthermore, the plates were incubated at 37°C for 24h. For both techniques, controls without and with antibacterial activities, sterilized classII purified water (APCII) and 0.12% chlorhexidine gluconate (CHX) were used in the experiments, respectively. It should be noted that APCII did not show any antibacterial activity. The means of halos of inhibition of ANO 20%, ANO 100% and CHX were: *S. aureus* (20.1mm, 41mm and 21mm), *E. coli* (11.4mm, 41mm and 20mm) and MRSA (21.5mm, 48.3mm and 20mm). In addition, the MID of ANO and CHX were: *S. aureus* (0,9mg/mL and 0,0005µl/mL), MRSA (0,9mg/mL and 0,0005µl/mL) and *E. coli* (3,9mg/mL and 0,002µl/mL). In conclusion, ANO showed antibacterial activity against all bacterial strains evaluated in this study. Also, in the double-layer agar diffusion well technique, 20% ANO presented a halo similar to 0.12% CHX and, when pure, it was superior. As for MID, ANO showed greater antibacterial activity against gram-positive bacteria (*S. aureus* and MRSA).

Keywords: Bacterias, Microbiology, Niobium.

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