

TITLE: *IN VITRO* EVALUATION OF ANTIMICROBIAL ACTIVITY OF POLYMERIC BIGUANIDE

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ABSTRACT:

The use of chemical agents for controlling microbial growth configure itself as a strategy to reduce the biological risk associated to surfaces. The objective of this study was to evaluate *in vitro* the antimicrobial activity of polyhexamethylene biguanide (PHMB) through diffusion-well on double-layer agar techniques, maximum inhibitory dilution (MID) and counting of colony-forming units (CFU) before and after disinfection of metallic surface. *Staphylococcus aureus* (ATCC 25923) and *Pseudomonas aeruginosa* (ATCC 27853) strains were used for carrying out this study. For the diffusion-well technique, the plates were prepared with two layers (base layer and seed layer). Afterward, 3mm-diameter wells were made and filled with 20µL of product for evaluation of inhibition halo. For MID, 96-well polystyrene microplates were used for determining the highest product dilution that inhibits bacterial growth. The plates used in diffusion-well and MID techniques were incubated at 37°C for 24h in chamber. Moreover, stainless-steel plates were divided into 12 quadrants, given that sterilized filter-paper fragments were placed in each one of the quadrants and contaminated with 1mL of standardized bacterial inoculum (10³CFU/mL) in *Tryptic Soy Broth* (TSB) on the pieces of paper. The quadrant samples were collected with Rodac® plates containing *Lethen Agar* (LA), before and after the disinfection, and incubated in chamber at 37°C for 24h. PHMB, in microbiological analyses (diffusion well and DIM), proved to be effective against *S. aureus* and *P. aeruginosa* strains, presenting similar and/or superior results to sodium hypochlorite and enzymatic detergent. In stainless-steel surface disinfection, intentionally contaminated by *P. aeruginosa*, there were no differences between the results of PHMB and ethanol at 70%. However, for *S. aureus*, it was observed that PHMB was more effective to reduce microbial load when compared with ethanol at 70%, once 3 of 18 samples presented growth after the disinfection procedure. To conclude, the presented results instigate us to develop future researches about the use of PHMB on environmental surfaces in health care, contributing, thus, with scientific evidences about the topic and promoting the use in a safe way.

Keywords: disinfection, infection control, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, polyhexamethylene biguanide.

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