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Microbial control with nitrate and perchlorate copper complexes

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Microbial growth in the food industry is a growing concern, especially when it comes to *Campylobacter jejuni*. Free multidrug-resistant strains and their biofilms grow easily in these environments and represent a major public health challenge. In addition to being an essential micronutrient for all living organisms, the antimicrobial effect of copper is recognized worldwide, but its binding to nitrate and perchlorate is less explored in the control of foodborne pathogens. The aim of this study was to evaluate the antimicrobial and antibiofilm effect of two copper compounds on 14 multidrug-resistant *C. jejuni* strains provided by the Ministry of Agriculture and Livestock (MAPA) and stored at the Molecular Epidemiology Laboratory (LEPMOL-UFU). For the tests, the reactivated strains were resuspended in saline and subjected to the minimum inhibitory concentration test for the copper compounds CBP-01-perchlorate (complex I) and CBP-01-nitrate (complex II) at concentrations of: 400, 200, 100, 50, 25, 12.5, 6.25 and 3.125 µM. For the biofilms, the strains were supplemented with *chicken juice* and kept in 96-well microplates in microaerophilia. After obtaining the biofilms, they were classified using the crystal violet method and subjected to the same concentrations of complexes I and II to assess their ability to inhibit sessile cells, using the broth microdilution method. Visualization of the biomass formed before and after the formed before and after treatment with copper complexes was visualized using Scanning Electron Microscopy. All the strains were also classified as strong biofilm producers. For complex I, inhibition of *C. jejuni* strains in the sessile form was obtained at an average concentration of 100µM, while planktonic inhibition was significantly lower with a total average value of 12.5µM . For complex II, the concentration was 400µM for the sessile forms and 200µM for the free forms, which indicates a greater inhibitory effectiveness of both forms with the use of the first compound. Strain-dependent behavior was found for both compounds, with complex I being the most effective. Scanning microscopy showed that the treated groups had a biofilm in the death or disintegration phase, with matrix destruction, absence of pores, bacterial exposure and evidence of cell death. It was clear that the treatment with both compounds demonstrated the antimicrobial and antibiofilm effect on different strains of *C. jejuni*, making evident the high susceptibility of the microorganism, which could characterize a way of controlling the pathogen in food industries.

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