Title INHIBITORY ACTIVITY OF STAPHYLOCOCCINS AGAINST *STAPHYLOCOCCUS AUREUS* STRAINS ISOLATED FROM FOOD

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Abstract:

Microbiological contaminants, including *Staphylococcus aureus,* are the leading cause of foodborne illnesses. Bacteriocins are antimicrobial peptides or proteins ribosomally synthesized by some bacteria that have inhibitory activity against other bacterial strains. Some bacteriocins produced by *Staphylococcus* spp., the staphylococcins, have the ability to inhibit various human and animal pathogens. Due to their spectrum of action, staphylococcins have potential biotechnological applications, either as biopreservatives in the food industry or as a preventive or therapeutic method to treat bacterial infections. Thus, the purpose of this study is to analyze the sensitivity of *S. aureus* strains isolated from food against 12 staphylococcins aiming a potential industrial application. In a previous study, 15 bacterial strains isolated from cheese and sausage were submitted to phenotypic characterization tests, and only six strains (40%) were identified as *S. aureus*. The presence of genes encoding enterotoxins (SEA, SEB, SEC, SED, SEE, SEG, SEH, SEI and SE*I*J) was tested by the PCR (polymerase chain reaction) technique. Three strains were positive for the presence of the genes *sea* and *seb*, and the six strains tested proved to be positive for the presence of *seh*. In relation to biofilm production, all strains were classified as moderate producers. The *S. aureus* strains were also shown to be sensitive to four staphylococcins: aureocin A53, lysostaphin, hyicin 4244 and Pep5. However, hyicin 4244 was replaced by hyicin 3682, because its purification method is incompatible with the objective of this work. These staphylococcins were then partially purified by ammonium sulfate precipitation and cation exchange chromatography, and used in titration and kinetic action tests in microtiter plates against the strains of *S. aureus*. The objectives of these tests are a quantitative assay of each staphylococcin and detection of either a bactericidal or bacteriostatic activity. The results showed that aureocin A53, lysostaphin and Pep5 exhibited a bactericidal (and bacteriolytic) activity, whereas only a reduction of bacterial growth was caused by hyicin 3682. The results were quite satisfactory for the industrial application of staphylococcins as biopreservatives. To conclude the work, the adsorption of staphylococcins to a plastic material used for food packaging will be tested.

Keywords: *Staphylococcus aureus*, bacteriocins, staphylococcins, food, biopreservatives

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