Evaluation of leguminous lectins activities against bacterial biofilm formation

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Biofilms are composed by microbial cells that are irreversibly associated with a surface and enclosed in a matrix of polymeric material. Lectins are sugar binding proteins of non immune origin that agglutinate cells and/or precipitate glycoconjugate molecules. Due to their capacity to bind and recognize specific carbohydrates, lectins can be a potent tool in biofilm studies. The search for potential phytochemicals as anti-biofilm agents has become an active area of research, and these proteins can bind to the bacteria or prevent the interaction with the surface and consequently decrease biofilm formation.

Thus, the present work aims to evaluate in vitro the antibacterial activity of plant lectinsfrom Canavalia genus against a panel of bacteria of medical relevance, and to inspect their capacity to interfere on the initial adhesion events and biofilm formation.

The assays were carried out using different concentrations of leguminous lectins, isolated from *Canavalia ensiformis* (ConA), *C. maritima* (ConM) and *C. boliviana* (ConBol). The effect of lectins was tested on *Klebsiella oxytoca* ATCC13182, *Pseudomonas aeruginosa* ATCC10145, *Staphylococcus epidermidis* CECT231 and *Staphylococcus aureus*. The bacterial planktonic growth in the presence of the lectins was determined trough absorbance measurement at 640 nm. Adhesion and biofilm assays were performed in polystyrene plates, and chalenged with the three lectins. The biomass accumulated was quantified using crystal violet staining.

The results showed that ConA emerged as the most promising lectin since it clearly reduced the bacterial plankctonic growth, specially of the Gram+ strains, with MIC values ranging between 30 and 125 µg/mL. ConA also disturbed the initial adhesion events of all bacteria and disturbed the biofilm formation ability of the *Staphylococcus* species for all the concentrations tested. Concerning Gram- bacteria, its biofilm formation ability was only prejudiced with higher concentrations of the lectin. Therefore, the results seem to highlight that the antimicrobial activity of ConA was more noticeable in the disturbance of bacterial adhesion and biofilm formation than impairing planktonic growth.

In conclusion, our results show that lectins, an important class of natural products, possess promising antibiofilm activity, suggesting that they may have therapeutic potential for the pharmacological treatment of biofilm-associated infections.

Keywords Leguminous lectins, Antimicrobial natural products, Biofilm-associated infections control

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