Safety and beneficial properties of bacteriocinogenic Lactococcus lactis and Pediococcus pentosaceus strains with activity against oral cavity related and antibiotic-resistant pathogens

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Bacteriocins are antimicrobial peptides produced by bacteria that have significant potential in pharmaceuticals and bio preservation. In the pharmaceutical industry, bacteriocins offer a promising alternative to traditional antibiotics, especially in the fight against antibiotic-resistant bacteria. Their targeted mode of action reduces the risk of pathogens and spoilage, but with minimal effect on the beneficial microorganisms, making them a safer option for treating infections. Additionally, bacteriocins can be engineered to enhance their stability and efficacy, broadening their therapeutic applications.

In bio preservation, bacteriocins play a crucial role in extending the shelf life of food products by inhibiting the growth of spoilage and pathogenic microorganisms. Their natural origin and effectiveness at low concentrations make them an attractive choice for maintaining food safety and quality without relying on synthetic preservatives. Overall, the use of bacteriocins in these fields not only promotes health and safety but also supports sustainable and eco-friendly practices.

Previously isolated from kimchi and banana and identified as bacteriocinogenic strains, *Pediococcus pentosaceus* 732, *Lactococcus lactis* subsp. *lactis* 431 and *Lactococcus lactis* 808 were evaluated for their safety and beneficial properties, including *in vitro* inhibition of *Listeria monocytogenes* ATCC 15313 and *Staphylococcus simulans* KACC 13241 and *Staphylococcus auricularis* KACC 13252, respectively. According to the performed physiological, biochemical, and biomolecular PCR analysis, *Pd. pentosaceus* 732, *Lc. lactis* subsp. *lactis* 431 and *Lc. lactis* 808 can be considered as safe, since none of the examined virulence genes was detected in the DNA of the studied LAB. However, only *gad* gene associated with GABA production was recorded in DNA isolated from *Lc. lactis* 808 and *Lc. lactis* subsp. *lactis* 431 strains. All tested LAB were ?-hemolysins and non-producers of gelatinase and biogenic amines, which suggested their safety potential. Also, they were relatively susceptible to antibiotics except for streptomycin, tobramycin, and vancomycin for *Pd. pentosaceus* 732. The growth of *Pd. pentosaceus* 732, *Lc. lactis* subsp. *lactis* 431 and *Lc. lactis* 808 and their survival were not significantly affected by ox bile (up to a maximum of 3%) and pH (except pH 2.0 and 4.0). Also, the examined LABs were not inhibited by various commercial extracts as well as most of the tested medications tested in current study. They did not produce proteolytic enzymes but D/L-lactic acid and ?-galactosidase. They were designated as hydrophilic. Furthermore, their survivability in artificial saliva, gastric simulation, and enteric passage was measured and followed by the challenge test to evaluate their ability to inhibit the selected oral pathogens in the oral saliva model conditions.

References

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Acknowledgements: This research was partially supported by the Centre for Research and Development in Agrifood Systems and Sustainability, funded by FCT (UIDB/05937/2020 and UIDP/05937/2020), Fundação para a Ciência e a Tecnologia, Portugal; by FAPESP, processo 2023/05394-9, Sao Paulo, SP, Brazil.