New preclinical data on adjunctive antibacterial therapies

Association of bacteriocins and lactic bacteria to inhibit Staphylococcus aureus in Minas fresh cheese

E. Martins¹, R.C. Rodrigues¹, M.C.D. Vanetti²

¹ONIRIS, NANTES, France
²Federal University of Viçosa UFV, Viçosa, Brazil

Objective

Due to the high incidence of S. aureus in Minas fresh cheese, the aim of this study was to evaluate the effect of bovicin HC5, nisin and lactic bacteria on the growth and production of enterotoxins by S. aureus in Minas fresh cheese.

Methods

The growth of strains of S. aureus ATCC 6538, EMBRAPA 4018, FRI 722 was conducted in tryptic soy broth (TSB) and reconstituted skimmed milk powder 10% (RSM 10%) at 37 °C, in the presence of bovicin HC5 and/or nisin and Lactococcus lactis ATCC 19435. Minas fresh cheese samples produced with starter culture (Lactococcus lactis subsp. lactis and L. lactis subsp. Cremoris) were inoculated with approximately 10^6 UFC.g^-1 of strains of S. aureus and were containing added of 1200 UA.g^-1 of bacteriocins. The detection of staphylococcal enterotoxin (SE) in culture medium, milk and cheese was conducted using the immunoenzymatic test VIDAS® Staphenterotoxin system II.

Results

The presence of bacteriocins increased lag phase and nisin showed this effect more pronounced. Although the bacteriocins have shown initial inhibitory effect, S. aureus started to grow again and achieved the final population similar to the control treatment, without bacteriocins, after 24 h incubation. The enterotoxin production by strains of S. aureus evaluated in this study was detected in TSB medium both in the absence or presence of bacteriocins added to the culture medium. The coculture of S. aureus and L. lactis did not affect the growth of the pathogen, but it was sufficient to inhibit the production of enterotoxins. In RSM 10%, bacteriocins combined to 1200 UA.mL^-1 exerted bactericidal effect on the strains of S. aureus and it was not possible to recover survivors by plate count technique after 96 h incubation.

The addition of bacteriocins combined in Minas fresh cheese reduced the initial population of S. aureus, starter bacteria and contaminant microbiota of the cheese. The presence of enterotoxins was not detected in cheeses produced with starter cultures, added or not of bacteriocins nisin and bovicin HC5.

Conclusion

The bacteriocins and lactic bacteria in Minas fresh cheese does not ensure the microbiological safety of the product. The association nisin and bovicin HC5 reduced the initial population of S. aureus, however the pathogen was able to recover the growth during the storage time. The results in culture medium suggest that the bacteriocins increase the production of SE in S. aureus.

Therefore, it was conclude that the bacteriocins should be used as coadjuncts to the control of the S. aureus in cheese, since the risk of food intoxication was not eliminated. On the other hands, lactic bacteria do not prevent the S. aureus growth but can inhibit the production of SE in cheeses.