SYNTHESIS AND CHARACTERIZATION OF CHITOSAN/PLA NANOPARTICLES FOR POTENTIAL APPLICATION IN BOVINE MASTITIS TREATMENT

K. C. de Castro[1,*,#], L. H. I. Mei[2], F. C. Carvalho[3], E. A. N.Martins[4], R. F. C. Marque[5], M. G. N. Campos[1,2]

[1]Federal University of Alfenas, Institute of Science and Technology, Graduate School of Materials Science and Engineering, Poços de Caldas-MG, Brazil.
[2]University of Campinas, Faculty of Chemical Engineering, Department of Materials Engineering and Bioprocess, Cidade Universitária Zeferino Vaz, Campinas-SP, Brazil.
[3]Federal University of Alfenas, Faculty of Pharmacy, Graduate School of Pharmaceutical Sciences, Alfenas-MG, Brazil.
[4]Federal Institute of Education, Science and Technology of South of Minas Gerais, School of Veterinary Medicine, Campus Muzambinho, Muzambinho-MG, Brazil.
[5]Paulista State University, Chemistry Institute, Araraquara/SP, Brazil

[#]Corresponding author: cappuccio.karine@gmail.com

Bovine Mastitis causes severe impact on the dairy sector, causing serious losses, functional impairment of mammary gland, as well as the reduction of milk production. In addition, it may cause serious risks to public health, since the major species of bacterial pathogens causing mastitis are toxin-producers, which can contaminate the milk. Traditional treatment of bovine mastitis involves local application of antibiotic cream, requiring high dosage due to the low efficiency of local release. In this context, nanotechnology is a very interesting alternative to overcome the limitations of conventional treatment of mastitis, by creating nanostructured devices that can deliver the antimicrobial to both the surficial glandular epithelium and to the interior of the affected tissue. Chitosan (CH) and poly-lactic acid (PLA) are natural polymers and have interesting properties for application as biomedical nanodevices, which includes biocompatibility and biodegradability. In this perspective, the aim of this study was to synthetize CH/PLA nanoparticles by nanoemulsion methodology for potential use in the controlled release of antibiotics. The CH/PLA nanoparticles were characterized by Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), Particle Size Distribution (DLS), Surficial Charge (Zeta Potential) and Thermal Stability (Thermogravimetric analysis, TG). SEM micrographs showed rounded and aggregated particles with a wide diameter distribution. This result was confirmed by DLS and the average particle size was in the micrometric range (1,12 at 4,14 μm) probably due to particles-aggregation, although nanometric diameter peaks were also shown. FTIR spectra showed characteristic peaks of CH, indicating that it is covering PLA in a core shell model. This result was confirmed by the zeta potential analysis that showed high positive surficial charge due to CH cationic nature and indicated good stability of the solution. Finally, TG showed an increase on the thermal stability of the CH/PLA nanoparticles when compared to their components separately.

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