

Submission ID

42

Title (required)

Engineering Antibiotic-Loaded Colloids by Nano Spray Drying: Effect of Eudragit RS/RL Ratio on Release and Antimicrobial Performance

Abstract (required)

Nano spray drying has emerged as a powerful particle engineering technique for producing polymeric nanoparticles (NPs) with controlled size and high reproducibility. In this study, cefuroxime axetil (CA)–loaded NPs based on Eudragit RS100 and/or RL100 were prepared using a nano spray dryer to evaluate the feasibility of this approach for antibiotic-loaded colloidal systems. Six polymer compositions were successfully processed into free-flowing NP powders suitable for pharmaceutical evaluation. Drug content, production yield, and particle size distribution analyses confirmed efficient drug incorporation and uniform nanoscale characteristics. In vitro release studies demonstrated formulation-dependent CA release profiles related to differences in polymer permeability.The antimicrobial performance of the NP formulations was evaluated using agar diffusion assays against selected bacterial strains. In NP formulations containing CA, a clear antimicrobial activity was observed against both bacterial strains *Staphylococcus aureus* ATCC29213 and *Escherichia coli* ATCC35218 with 12-14 mm inhibiton zones. The findings indicate that the antimicrobial efficacy is concentration-dependent and directly associated with the presence and amount of CA in the formulation. Compared to the free drug, NP-loaded formulations exhibited enhanced antibacterial activity, indicated by increased inhibition zone diameters, suggesting improved drug availability at the microbial interface. These findings highlight the potential of polymer-based NPs to modulate antibiotic performance through controlled delivery. Ongoing and planned studies include advanced physicochemical characterization such as FT-IR, DSC and NMR analysis to further elucidate drug–polymer interactions and solid-state properties. Overall, this work demonstrates the applicability of nano spray drying as a scalable and versatile approach for the development of antibiotic-loaded colloidal NPs with promising microbiological efficacy. This study was supported by Anadolu University Scientific Research Projects Commission under the grant no: YTT-2025-3144.

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For presenting Engineering Antibiotic-Loaded Colloids by Nano Spray Drying: Effect of Eudragit RS/RL Ratio on Release and Antimicrobial Performance

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