International Pre Conference Workshop on
Microbial Ecology & Eco Systems
June 28-29, 2018 | Alexandria, Egypt

Characterization and evaluation of antimicrobial activity of Chitosan nanoparticles loaded with Ciprofloxacin hydrochloride

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The aim of the present study is an attempt to formulate, characterize and evaluate the antimicrobial activity and the storage stability of Chitosan nanoparticles (CSNPs) loaded with Ciprofloxacin Hydrochloride. Ciprofloxacin HCl loaded CSNPs formed characterized by using transmission electron Microscope, Zetasizer and FT-IR spectroscopy. The study clearly demonstrated that both CSNPs and Ciprofloxacin HCl loaded CSNPs were in nanosize but Ciprofloxacin HCl incorporation increases particle size of nanoparticles compared to empty nanoparticles with almost 90.713 % Ciprofloxacin HCl encapsulation efficiency. Ciprofloxacin HCl loaded CSNPs displayed a lower positive zeta potential in comparison with the free CSNPs. CSNPs inhibited Escherichia coli bacteria (gram-negative bacteria) more efficiently when compared to Staphylococcus aureus (gram-positive) bacteria. Ciprofloxacin HCl loaded CSNPs demonstrated similar antimicrobial activity when compared to Ciprofloxacin HCl for both S. aureus and E. coli so Ciprofloxacin HCl loaded CSNPs retained its antimicrobial activity throughout the manufacturing process. For pharmaceutical applications, the storage stability of the nanoparticles is a great concern. The stability of Ciprofloxacin HCl loaded CSNPs was evaluated in terms of its drug content. Ciprofloxacin HCl loaded CSNPs were stable in both storage conditions but the Ciprofloxacin HCl loaded CSNPs were more stable in storage conditions at 4°C than room temperature. Therefore, a new nanoparticulate dosage form could be prepared by ionic gelation process using Tripolyphosphate as crosslinking agent without applying harmful organic solvent, heat or vigorous agitation that are damaging to sensitive proteins and also this new nanoparticulate form could retain its antimicrobial activity throughout the manufacturing process.

Keywords: Antimicrobial activity, Chitosan nanoparticles, CiprofloxacinHCl.

Biography

Mai M Abouelala received the B.E. degree in Pharmaceutical sciences from University of Alexandria, Egypt, in 2012, Diploma Degree in Clinical Pharmacy (Pharmacotherapy) from College of Cambridge Coatbridge, Scotland, in 2013, M.S. and PhD degrees in Medical Biophysics in Medical Biophysics from Medical Research Institute- Alexandria University in 2015 and 2018 respectively. Her research interests include nanomedicine using drug loaded nanoparticles as a controlled drug delivery systems to improve efficacy, reduce toxicity, and improve patient compliance.

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