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Solid lipid nanoparticles of ciprofloxacin hydrochloride with enhanced antibacterial activity

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Background and Aims: Ciprofloxacin HCl (CIP), a water soluble drug, was chosen to load in Solid Lipid Nanoparticles. SLNs represent a new generation of novel colloidal carriers possessing the advantages of both liposomes and polymeric nanoparticles while avoiding their disadvantages. In this study CIP loaded SLNs were prepared and their physicochemical characters, drug release and *in vitro* antibacterial effects against S. aureus and P. aeruginosa were determined.
Methods: SLN loaded with ciprofloxacin HCl were prepared by a microemulsion technique. Cetyl palmitate was used as the lipid core and polysorbate 80 (T80) as the surfactant. The mean particle size and and their zeta potential of SLNs was determined by Photon Correlation Spectroscopy (PCS). The entrapment efficacy (EE) and drug loading (DL) were measured using UV/Vis spectrophotome. *In vitro* release was determined using dialysis bag method in isotonic phosphate buffer pH 7.4. Antibacterial tests were carried out using Broth Micro Dilution technique. The antibacterial activity of CIP-SLN was compared to CIP solution. Drug free SLNs were used as control group.
Results: The mean particle size of SLNs was 95 ± 3 nm and their zeta potential was -1.9 mv. The entrapment efficacy (EE) and drug loading (DL) were reported 54.3% and 7.6% respectively. The release profile was biphasic with an initial burst release followed by a plateau and about 60% of the drug was released in the first 24 h. The antibacterial activity of CIP-SLNs against S. aureus and P. aeruginosa was increased significantly compared to CIP solution whils drug free SLN showed no antibacterial effect.
Conclusions: This study shows that SLNs can be a suitable carrier for CIP HCl and can improve its antibactrial activity.

Keywords: Colloidal carriers; Solid lipid nanoparticles; Ciprofloxacin hydrochloride; Antibactrial activity