

ABSTRACT

INVITRO EFFICACY OF NIOSOME ENCAPSULATED
FLUOROQUINOLONES AGAINST CIPROFLOXACIN RESISTANT
BACTERIAL STRAINS AND THE INVIVO EVALUATION OF NIOSOME
ENTRAPPED LEVOFLOXACIN AGAINST ATCC STRAINS OF
PSEUDOMONAS AERUGINOSA AND *STAPHYLOCOCCUS AUREUS* IN
AN INFECTIVE RAT MODEL.

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Antimicrobial resistance is spurred on by evolutionary adaptation of bacteria, indiscriminate abuse of antibiotics and pharmaceutical promotions. Non-ionic surfactant vesicles (niosomes) may protect the drug from the environment; alter the pharmacokinetic predisposition of the drug deliver the drug to the site of infection.

Niosomes were prepared by the thin film rehydration method and entrapment efficiencies for the fluoroquinolones in niosomes were $71.11 \pm 1.39\%$ (ciprofloxacin), $19.11 \pm 1.86\%$ (gatifloxacin), $34.23 \pm 1.86\%$ (levofloxacin) and $70.09 \pm 1.64\%$ (norfloxacin). The formulations displayed temperature-dependent stability with the highest stability occurring at 4°C and the lowest at 37°C . In-vitro release followed for niosomes showed a sustained release profile which followed first-order (concentration-dependent) release from the vesicles. The niosomes of fluoroquinolones produced at least two-fold reduction in MIC's against *Pseudomonas aeruginosa* and *Escherichia coli*, and at least four-fold reduction in MIC's against *Staphylococcus aureus*.

Acute and sub-acute toxicity studies indicated that the LD₅₀ of surfactant (sorbitan monosterate-span 60) is greater than 600mg/kg when injected intraperitoneally. Sorbitan monosterate appear to be non-toxic in the tested doses and experimental conditions and may not contribute to the potential toxicity of drug-loaded niosomes.

Infective studies were conducted using the up-down approach and the infective dose was based on clinical signs, survival and post mortem changes. The doses determined for *Staphylococcus aureus* (ATCC 29213) was 1.75×10^{10} and *Pseudomonas aeruginosa* (ATCC 27853) was 3.0×10^8 cfu/ml.

Infective studies were conducted and the niosome treated group showed quicker recovery from infection and faster reduction in WBC and neutrophil counts to baseline. Bacterial counts in the bloodstream were similar to that of the conventional formulation, but the niosome treated group showed greater reduction in bacterial counts in the liver, spleen and kidneys.

The results indicate the usefulness of drug encapsulation in niosomes although further evaluation of this colloidal carrier needs to be done.

Key words: fluoroquinolones, niosomes, drug delivery, peritonitis, pharmacokinetic.