Development of Controlled-Release microsphere Systems containing gentamycin for ophthalmic drug delivery: Preparation and Release Characteristics

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Abstract

Introduction: Targeting the therapeutic agents to the anterior and posterior segments of the eye has attracted extensive attention from the scientific community. Significant key factor in the success of ocular therapy is the development of safe, effective, economic and non-invasive novel drug delivery systems. Microspheres of poly carbolactone(PCL) and poly ethylene glycol containing gentamycine were prepared by a solvent diffusion-evaporation method as non-invasive ocular drug delivery systems.

Methods: The oil-in-water emulsion prepared in an aqueous solution of 0.05% poly(vinyl alcohol) medium with PCL and PEG , a water-soluble and less toxic solvent, was used as the dispersing solvent. The yield of the microspheres was up to 80%.

Result: Scanning electron microscopy (SEM) confirmed the microspheres had smooth surfaces, with sizes in the range of 489–550 μm. The drug loaded in microspheres was in an amorphous state, as confirmed by differential scanning microscopy (DSC). The release of the drugs was controlled for 2-7 days. The release kinetics followed different transport mechanisms depending on the drug to polymer ratio. Based on microbial assay of antibiotic test the microspheres showed excellent antibacterial activity against *Staphylococcus aureus.*

Conclusion: Therefore, a floating dosage form that is able to sustain release hydrophilic drugs within its extended retention time has been developed. We will be able to manufacture biodegradable biomimetic microsphere for long-term drug delivery of gentamycine in ocular.

Key Words: Microspheres, Release characteristics, release kinetics, PCL