

Formulation Development and Characterization of 5-Fluorouracil Based Microbeads Using Hydroxypropyl- β -Cyclodextrin for Innovative Drug Delivery

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SUMMARY. The aim of the study was to formulate microbeads of hydroxypropyl- β -cyclodextrin (HP- β -CD) using sodium alginate (SA) containing 5-fluorouracil (5-FU) by emulsion crosslinking technique. The microbeads were prepared by varying the concentration of hydroxypropyl- β -cyclodextrin (HP- β -CD) and sodium alginate (SA). The prepared microbeads were evaluated for swelling degree, drug entrapment, scanning electron microscopy (SEM), Fourier transforms infrared spectroscopy (FTIR), X-ray diffraction (XRD) and differential scanning calorimetry (DSC). SEM confirms the slight rough nature of microbeads. No significant drug polymer interactions were observed in FTIR studies. XRD and DSC revealed amorphous nature of drug after being entrapped. Gas chromatography confirms the absence of glutaraldehyde residue. The drug release shows excellent sustained drug release pattern.

RESUMEN. El objetivo del estudio fue formular microperlas de hidroxipropil- β -ciclodextrina (HP- β -CD) utilizando alginato sódico (SA) que contiene 5-fluorouracilo (5-FU) mediante la técnica por emulsión de entrecruzamiento. Las microperlas se prepararon mediante la variación de la concentración de hidroxipropil- β -ciclodextrina (HP- β -CD) y alginato sódico (SA), se evaluaron el grado de hinchamiento y el atrapamiento de drogas y se analizaron por microscopía electrónica de barrido (SEM), espectroscopia infrarroja por transformadas de Fourier (FTIR), difracción de rayos X (DRX) y calorimetría diferencial de barrido (DSC). SEM confirma el carácter liviano de las microesferas. No se observaron interacciones significativas del polímero y la droga en los estudios de FTIR. XRD y DSC revelaron la naturaleza amorfa del medicamento después de ser atrapado. La cromatografía de gases confirma la ausencia de residuos de glutaraldehído. El fármaco muestra un excelente patrón de liberación sostenida.

KEY WORDS: crosslinking, 5-fluorouracil, FTIR, hydroxypropyl- β -cyclodextrin, microbeads.

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