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Functionality Advancement of Poorly Soluble Drug by Comparative Study of Solubilizing Techniques with Molecular Simulation to *in vivo* evaluation

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Abstract : This study aimed at the functionality advancement of poorly soluble model drug i.e. Cefixime with HPBCD using comparative study of different solubility enhancement methods.
CFX formulations with hydroxypropyl-β-cyclodextrin (HP-β-CD) prepared by different solubility enhancement methods viz.,physical mixture, kneading method, solvent evaporation, spray drying, lyophilization/freeze drying, microwave irradiation method and compared their solubility enhancement as well as dissolution.
The optimized complexes characterized using ATR, 1H-NMR, ROSEY, XRD, SEM and DSC for confirming the complexation. In-vivo pharmacokinetic studies were performed using male wister rats (N=6) through oral route.
Hydroxy propyl Beta cyclodextrin inclusion complexation prepared by spray drying method was found to be optimized for complexation with cefixime.
Spray drying method was found to be better than other complexation techniques on basis of in-vitro dissolution studies. ATR, NMR, XRD, and DSC confirmed the formation of complex.
The *in silico* anticipations for mode of incorporation were in agreeing with the experimental proton NMR measure.
The bioavailability of cefixime was found to be enhanced more than3 times. In comparison to pure drug, statistically significant increase in the oral bioavailability was obtained with the HP-β-CD inclusion complex which was prepared by spray drying technique, with 347% increase in terms of Cmax.
This comparative study gave idea about best suited method for solubility enhancement along with molecular docking and NMR studies for anticipating mode of inclusion & thus, ultimately, improving the oral bioavailability of CFX.
Keywords : Cefixime, solubility, Inclusion complexation, HP-β-CD, cyclodextrin.

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