



Metoprolol Tartrate-Ethylcellulose Tableted Microparticles: Formulation and *In Vitro* Evaluation

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SUMMARY. This study introduced a novel phase separation technique for the microencapsulation of metoprolol tartrate as a model. Non-solvent addition coacervation technique was employed for the loading of drug into ethylcellulose, a hydrophobic plastic polymer. Dichloromethane (DCM) and paraffin oil were employed as solvent and non-solvent, respectively. Microparticle batches abbreviated as M1, M2 and M3 were formulated by embedding 1 g of drug into 1 g, 2 g and 3 g of polymer, respectively followed by direct compression into tableted microparticulate batches named a T1, T2 and T3, respectively. The drug and polymer remained intact in encapsulated form as confirmed by FTIR, XRD and DSC. However, a slight change in drug nature from crystalline to amorphous behavior and an endothermic peak for metoprolol tartrate at 130 °C was observed in drug and microparticle thermograms. Slightly aggregated spherical free flowing microparticles in a size range of 64 μm -103 μm were obtained. The entrapment efficiency ranged from 77% to 89%. The straight line obtained from a plot between square root of time (Hrs) *versus* drug release (%) and regression co-efficient (R^2) confirmed that best fit model to all dissolution profiles was Higuchi's model. The modes of drug release from microparticles and tableted microparticles were Quasi-Fickian diffusion and anomalous diffusion, respectively. T3 was selected as an optimum formulation as its dissolution profile resembled ($f_2 = 76.25$) Mepressor® (Novartis Pharma-Pakistan). The accelerated stability study, regarding dissolution behavior and drug contents, at 40°C/75% RH proved T3 stable in 40 °C/75% RH for six months. Non-solvent addition coacervation technique involving comparatively safe solvents such as dichloromethane and paraffin oil as solvent and non-solvent, respectively is a good techniques for the encapsulation of Biopharmaceutics Classification System class I drugs such as metoprolol tartrate.

KEY WORDS: Dissolution, Ethylcellulose, Kinetic models, Metoprolol tartrate, Non-solvent addition coacervation.

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