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Metoprolol Tartrate-Ethylcellulose Tabletted 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 tabletted 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 ºC 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 tabletted 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 40ºC/75% RH proved T3 stable in 40 ºC/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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