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Solubility Enhancement of Poorly Soluble Anticancer Drug, Docetaxel Using a Novel Polymer, Soluplus via Solid Dispersion Technique

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Abstract : This study was designed to evaluate and enhance the solubility of poorly soluble drug, docetaxel through solid dispersion (SD) technique prepared using freeze drying method. Docetaxel solid dispersions were formulated with Soluplus in different weight ratios. Freeze drying method was used to prepare the solid dispersions. Solubility of the solid dispersions were evaluated respectively and the optimized of drug-solubilizers ratio systems were characterized with different analytical methods like Differential scanning calorimeter (DSC), Scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR) to confirm the formation of complexes between drug and solubilizers. The solubility data revealed an overall improvement in solubility for all SD formulations. The ternary combination 1:5:2 gave the highest increase in solubility that is approximately 3 folds from the pure drug, suggesting the optimum drug-solubilizers ratio system. This data corresponds with the DSC and SEM analyses, which demonstrates presence of drug in amorphous state and the dispersion in the solubilizers in molecular level. The solubility of the poorly soluble drug, docetaxel was enhanced through preparation of solid dispersion formulations employing freeze drying method. Solid dispersion with multiple carrier system shows better solubility compared to single carrier system.

Keywords : docetaxel, freeze drying, soluplus, solid dispersion technique
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