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Liquisolid Systems to Improve the Dissolution of Furosemide

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Abstract

A liquisolid system has the ability to improve the dissolution properties of poorly water soluble drugs. Liquisolid compacts are flowing and compactable powdered forms of liquid medications. The aim of this study was to enhance the in vitro dissolution properties of the practically water insoluble loop diuretic furosemide, by utilising liquisolid technique. Several liquisolid tablets were prepared using microcrystalline cellulose (Avicel® pH-101) and fumed silica (Cab-O-Sil® M-5) as the carrier and coating materials, respectively. Polyoxy-ethylene-polyoxypropylene-polyoxyethylene block copolymer (Synperonic® PE/L 81); 1,2,3-propanetriol, homopolymer, (9Z)-9-octadecenoate (Caprol® PGE-860) and polyethylene glycol 400 (PEG 400) were used as non-volatile water-miscible liquid vehicles. The liquid loading factors for such liquid vehicles were calculated to obtain the optimum amounts of carrier and coating materials necessary to produce acceptable flowing and compactable powder admixtures viable to produce compacts. The ratio of carrier to coating material was kept constant in all formulations at 20 to 1. The formulated liquisolid tablets were evaluated for post compaction parameters such as weight variation, hardness, drug content uniformity, percentage friability and disintegration time. The in-vitro release characteristics of the drug from tablets formulated by direct compression (as reference) and liquisolid technique, were studied in two different dissolution media. Differential scanning calorimetry (DSC) and Fourier-Transform infrared spectroscopy (FT-IR) were performed. The results showed that all formulations exhibited higher percentage of drug dissolved in water (pH 6.4–6.6) compared to that at acidic medium (pH 1.2). Liquisolid compacts containing Synperonic® PE/L 81 demonstrated higher release rate at the different pH values. Formulations with PEG 400 displayed lower drug release rate, compared to conventional and liquisolid tablets. DSC and FT-IR indicated a possible interaction between furosemide and tablet excipients that could explain the dissolution results. Caprol® PGE-860, as a liquid vehicle, failed to produce furosemide liquisolid compacts.

Keywords

Liquisolid compacts • Furosemide • Dissolution • Friability • Synperonic® PE/L 81