Role of polymers as crystal growth inhibitors in coprecipitation via solutionenhanced dispersion by supercritical fluids (SEDS) to improve andrographolide dissolution from standardized Andrographis paniculata extract

ABSTRACT

The poor aqueous solubility and dissolution rate of andrographolide in aqueous gastrointestinal fluids often cause low oral bioavailability. In this work, Andrographis paniculata extract containing 16% andrographolide was coprecipitated with Pluronic F127, Eudragit EPO, and Eudragit L100-55 via solution-enhanced dispersion by supercritical fluids (SEDS) to improve andrographolide dissolution in simulated intestinal fluid (pH 7.4). The SEDS working parameters were set constant as follows: 150 bar, 40 °C, CO2 flow rate 15 L/min (1 bar, 25 °C), liquid feed flow rate 0.5 mL/min, and 25 mg/mL of A. paniculata extract. SEDS coprecipitates formulated with lower Eudragit L100-55:A. paniculata mass ratios exhibited improved andrographolide dissolution in SIF (pH 7.4), while SEDS coprecipitates formulated with either Pluronic F127:A. paniculata or Eudragit EPO:A. paniculata at any mass ratio exhibited poorer andrographolide dissolution (<0.03 mg/mL released in 90 min) than SEDS-precipitated A. paniculata extract powder (0.06 mg/mL released in 90 min). In particular, SEDS coprecipitates formulated with a Eudragit L100-55:A. paniculata mass ratio of 6:25 were found to have the highest andrographolide release and dissolution rate in SIF (pH 7.4) (0.09 mg/mL released in 30 min). SEDS coprecipitation was successful, as indicated by differential scanning calorimetry (DSC), thermogravimetric analysis (TGA) and Fourier-transform infrared (FTIR) analysis.

Keyword: Polymer; Crystal growth inhibitor; SEDS coprecipitation; Andrographolide; Dissolution