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Preparation and characterization of solidified SMEDDS containing flurbiprofen by spray drying method

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Flurbiprofen, a non-steroidal anti-inflammatory agent, is used to treat rheumatoid arthritis and sore throat [1]. However, it gave poor water solubility, and various solubilization technique such as self-microemulsifying drug delivery system (SMEDDS) has been used to improve the solubility, dissolution and oral bioavailability [2].

The objective of this work was to develop redispersible solidified SMEDDS containing water-insoluble flurbiprofen with enhanced solubility. Various compositions were investigated with medium chain triglyceride, surfactant and co-surfactant, to obtain stable SMEDDS. The selected SMEDDS was dissolved in 70% ethanol and adsorbed to fumed silicon dioxide with the weight ratio of 1/1 by spray drying method. The powder characteristics of the solidified SMEDDS were determined by DSC and microscopic observation. The solidified SMEDDS was dispersed in water and the particle size distribution was compared to the initial SMEDDS. The SMEDDS composed of Cremophor EL and Capryol 90 with 1/1 weight ratio without co-surfactant, dissolved flurbiprofen of 20 mg/mL and showed transparent dispersion in water. The solidified SMEDDS appeared to be small uniform particles in the microscopic observation with flowing property. In the DSC, the peak melting of crystalline flurbiprofen disappeared in the solidified SMEDDS, which mean the non-crystalline state of flurbiprofen. The mean particle size of the redispersed solidified SMEDDS (273.5 nm) in water was about 13-fold higher than the initial SMEDDS (20.1 nm). However, the solidified SMEDDS gave the physically stable SMEDDS without phase separation during a week. In conclusion, it would mean that the solidified SMEDDS formed emulsion spontaneously in water and improved the solubility of water-insoluble flurbiprofen.

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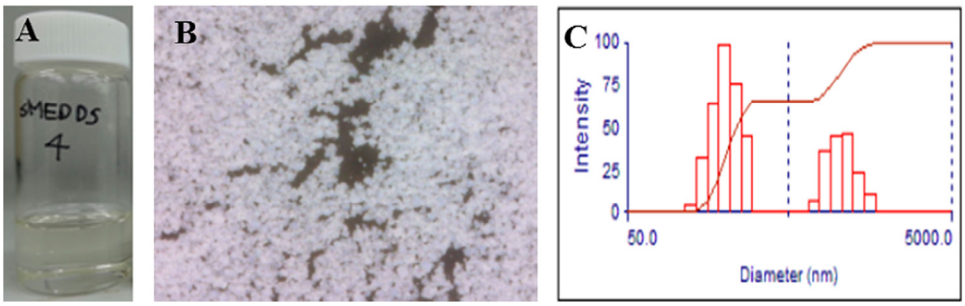

Fig. 1 SMEDDS photograph (A), solidified SMEDDS photograph (B) and particle size distribution of solidified SMEDDS (C).

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