

Optimization of quercetin loaded palm oil ester based nanoemulsion formulation for pulmonary delivery

ABSTRACT

In this research, the palm oil ester (POE)- based nanoemulsion formulation containing quercetin for pulmonary delivery was developed. The nanoemulsion formulation was prepared by high energy emulsification method and then further optimized using D-optimal mixture design. The concentration effects of the mixture of POE:ricinoleic acid (RC), ratio 1:1 (1.50-4.50 wt.%), lecithin (1.50-2.50 wt.%), Tween 80 (0.50-1.00 wt.%), glycerol (1.50-3.00 wt.%), and water (88.0-94.9 wt.%) towards the droplet size were investigated. The results showed that the optimum formulation with 1.50 wt.% POE:RC, 1.50 wt.% lecithin, 1.50 wt.% Tween 80, 1.50 wt.% glycerol and 93.90 % water was obtained. The droplet size, polydispersity index (PDI) and zeta potential of the optimized formulation were 110.3 nm, 0.290 and -37.7 mV, respectively. The formulation also exhibited good stability against storage at 4°C for 90 days. *In vitro* aerosols delivery evaluation showed that the aerosols output, aerosols rate and median mass aerodynamic diameter of the optimized nanoemulsion were 99.31%, 0.19 g/min and 4.25 μ m, respectively. The characterization of physical properties and efficiency for aerosols delivery results suggest that POE- based nanoemulsion containing quercetin has the potential to be used for pulmonary delivery specifically for lung cancer treatment.

Keyword: Palm oil ester; Quercetin; Nanoemulsion; Aerosols; Pulmonary delivery