

## **Development and characterization of aerosol nanoemulsion system encapsulating low water soluble quercetin for lung cancer treatment**

### **ABSTRACT**

Palm-based nanoemulsion containing low water soluble drug quercetin for lung cancer via aerosol delivery was prepared in this study. Formulation of quercetin nanoemulsion having the desirable criteria was 1.5 % of palm oil ester:ricinoleic acid (1:1 ratio), 1.5 % of lecithin, 1.5 % of Tween 80, 1.5 % of glycerol, and 93.95% of water. The formulation was carried out using low and high energy emulsification method. The characterization of zetasizer analysis showed the droplet size and zeta potential of quercetin nanoemulsion were  $106.1 \pm 0.44$  nm and  $-43.7 \pm 3.57$  mV, respectively. In addition, the particle size measured in TEM is consistent with the size obtained using Zetasizer and confirmed that the nanoemulsion droplets of formulations were spherical. Medium mass aerodynamic diameter, fine particle fraction (% FPF < 5  $\mu$ m) and geometric standard deviation (GSD) value of nanoemulsion were  $4.25 \pm 0.38$   $\mu$ m,  $70.56 \pm 66.33$  and  $1.96 \pm 0.07$ , respectively. The formulation exhibited good viscosity, conductivity, osmolality and pH values as well as stability against phase separation and storage at temperature 4 °C for 3 months. These results suggest that palm oil - based nanoemulsion in this study could be successful nanocarrier system of quercetin as pulmonary delivery for lung cancer treatment.

**Keyword:** Quercetin; Nanoemulsion; Lung cancer; Aerosols; Pulmonary delivery