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Optimization of Encapsulation Efficiency of *Coccinia grandis* (L.) Voigt Extract Encapsulated Nanoliposomes

A.S.D. Wickramasinghe, A.P. Attanayake and P. Kalansuriya

Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Sri Lanka

Corresponding author: p_kalansuriya@med.ruh.ac.lk

Nanoliposomes are commonly used in the encapsulation and delivery of plant polyphenols. This technology offers an attractive strategy to address the limitations in bioavailability and stability of polyphenols. Leaves of *Coccinia grandis* (L.) Voigt is a rich source of polyphenols which exhibit antidiabetic effects. Encapsulation of *C. grandis* extract into nanoliposomes may lead to the development of a novel therapeutic agent against diabetes mellitus. This study attempted at optimizing encapsulation efficiency (EE) of *C. grandis* leaf extract encapsulated nanoliposomes at varying loading concentrations of the plant extract. Nanoliposomes were formulated by modified emulsification and ultrasonic method using ethanolic solution of phosphatidylcholine and cholesterol (20:1) as the lipid phase and phosphate buffered saline mixed with Tween® 80 (0.1% v/v) as the aqueous phase. Particle size and poly dispersity index (PDI) of the nanoparticles were determined by dynamic light scattering. Formulation of *C. grandis* leaf extract encapsulated nanoliposomes were initiated by dissolving different solvent extracts [distilled H_2O, EtOH (70% v/v) and EtOH (100% v/v)] in the lipid phase at different concentrations (1.5, 3, 6 and 9% w/v). The EE was determined by quantifying the polyphenols of the extract and the unloaded polyphenols after encapsulation. The encapsulated nanoliposomes were freeze dried for determination of loading capacity (LC). Creaming Index of nanoliposomes were determined. The Z-average particle diameter of blank liposome nanoparticles was 132.56 ± 5.48 nm with a polydispersity index (PI) of 0.499. The maximum EEs and LCs for aqueous (44.10 ± 2.77%, 2.5 ± 0.25%) and EtOH (70% v/v) (35.76 ± 3.51%, 1.6 ± 0.17%) were obtained when extracts were loaded at 6% w/v. The EtOH (100% v/v) extract showed the highest EE and LC (50.12 ± 2.58%, 1.1 ± 0.07%) when loaded at 3% w/v. Creaming index of all formulations was in a range of 90.2-94.8% indicating favourable stability. Obtained data could be used in future investigations on *C. grandis* leaf extract encapsulated nanoliposomes for the development of nano-nutraceuticals with improved therapeutic outcomes.

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