OP 11

In-vitro antidiabetic activity of *Gmelina arborea* Roxb. aqueous extract encapsulated nanoliposomes

Wadasinghe RR[1*], Kalansuriya P[2], Attanayake AP[2], Bandara BMR[1]

[1]Postgraduate Institute of Science, University of Peradeniya, Sri Lanka, [2]Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka

Background: *Gmelina arborea* Roxb. (Common name: Eth Demata) is a medicinal plant that is used for the treatment of diabetes mellitus from ancient times. Nanoencapsulation of natural drugs is widely applied to enhance bioefficacy. The aim of the study was to investigate the anti-diabetic properties of *G. arborea* aqueous extract encapsulated nanoliposomes.

Objective: To optimize the encapsulation of *G. arborea* aqueous extract (GAE) in nanoliposomes and investigate the *in vitro* anti-diabetic activity of GAE encapsulated nanoliposomes (GAE-NLS).

Methods & Materials: Void nanoparticles were synthesized using a modified emulsification and ultrasonication method where a lipid phase [phosphatidylcholine and cholesterol (20:1)] and an aqueous phase [phosphate buffer saline (pH 6.8) with Tween® 80 (0.1% v/v)] were mixed. GAE-NLS were synthesized using GAE (0.75, 1.5, 3.0% w/v) in the lipid phase. The encapsulation efficiency (EE) and the loading capacity (LC) of GAE-NLS were calculated. In *vitro* α-amylase, glucose adsorption, and glucose uptake assays were performed for optimized GAE-NLS.

Results: The particle size, zeta potential and polydispersity index (PDI) of void nanoliposomes were 318.45±1.06 nm, –21.15 mV, and 0.329±0.003, respectively. The particle size, PDI, EE, and LC of the optimized GAE-NLS (1.5% w/v) were 306.90±2.12 nm, 0.419±0.006, 84.33±0.37%, and 0.021±0.0003% respectively. The glucose adsorption corresponding to GAE-NLS (0.20 mmol/g) was significantly higher than that for GAE which does not have glucose adsorption at 50 mM glucose concentration ($p<0.05$). However, the α-amylase inhibitory activity (IC_{50}) of GAE-NLS (1.40±0.12 mg/mL) was less than that of GAE (0.029±0.006 mg/mL) ($p<0.05$). The glucose uptake corresponding to GAE-NLS (7.72±1.05%) was significantly higher than that for GAE (16.64±0.73%) at 10 mM glucose concentration.

Conclusion: Synthesized nanoliposomes GAE-NLS have a moderately homogenous population of phospholipid vesicles. GAE-NLS produce better glucose adsorption and glucose uptake than GAE.

Acknowledgement: Financial assistance by AHEAD/DOR/15 research grant.