
Optimization of Preparation of Alginate Nanoparticles for Encapsulation of Ivy Gourd Extract

W.N.D. De Silva^a, A.P. Attanayke^a, D. N. Karunaratne^b, K. M. G. K. Pamunuwa^c and L.D.A.M. Arawwawala^d

^aDepartment of Biochemistry, Faculty of Medicine, University of Ruhuna, Sri Lanka

^bDepartment of Chemistry, Faculty of Science, University of Peradeniya, Sri Lanka

^cDepartment of Horticulture and Landscape Gardening, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka, Sri Lanka

^dIndustrial Technology Institution, Sri Lanka

Corresponding author: anoja715@yahoo.com

Nanoencapsulation is an innovative approach to overcome the limitations of conventional herbal extracts that are used as therapeutic agents. The optimization of conditions in the preparation of nanoparticles is critical in the development of nanonutraceutical formulations from edible plant extracts. The objective of the present study was to optimize the conditions such as temperature, amount of surfactant and the process (speed of stirring and homogenization) in order to develop Ivy gourd *Coccinia grandis* L. (Cucurbitaceae) leaf extract encapsulated alginate nanoparticles with an appropriate particle size and encapsulation efficiency. Alginate nanoparticles were synthesized using ionic gelation method varying the conditions as temperature, amount of surfactant and the process using magnetic stirrer and homogenizer. Span 80 was used as the surfactant. The particle size analysis (PSA) measurements were obtained at each step of the optimization process. The aqueous leaf extract of *C. grandis* (1 mg/mL) was encapsulated using the ionic gelation method under the optimum conditions. The resultant pellet was subjected to the PSA. The encapsulation efficiency of nanoencapsulated aqueous leaf extract was calculated with respect to the total phenol content in the supernatant. The optimized conditions in the nanoparticle formation were temperature at 30 °C, 5 drops of span 80 and stirring at a speed of 1100 and 1400 rpm (after addition of cross linker - CaCl₂). The particle size obtained for the blank nanoparticles under optimum conditions was 433.70 ± 54.32 nm. The particle size and encapsulation efficiency of nanoencapsulated aqueous leaf extract of *C. grandis* were 520.30 ± 38.79 nm and 54.56% respectively. The temperature, amount of surfactant and the process (speed of stirring and homogenization) affects the particle size of alginate nanoparticles. The optimized conditions were adequate to obtain a satisfactory encapsulation efficacy of *C. grandis* leaf extract and the optimized conditions will be used in the further development of herbal nanonutraceutical formulation/s using ivy gourd.

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