PP 8

In vitro antioxidant activity of different extracts of *Coccinia grandis* L. encapsulated alginate nanoparticles

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Background: Bioactive compounds in herbs have gained remarkable interest in medicine due to their ability to scavenge free radicals. The nanoencapsulation of extracts is an effective approach to enhance the stability of extracts with slow-release and targeted drug delivery. Therefore, it leads to an effective antioxidant potential as a nano drug.

Objective: The present study is carried out to determine the antioxidant activity of *Coccinia grandis* L. (Family: Cucurbitaceae) encapsulated alginate nanoparticles (solid form) with different solvents.

Methods & Materials: Solvent extracts of *C. grandis* were prepared by using aqueous, 100% ethanol, 50% ethanol, 50% acetone through ultrasonication followed by refluxing (2½ hours). The prepared extracts (0.5–5 mg/mL) loaded alginate nanoparticles were synthesized via ionic gelation with the addition of extracts and $CaCl_2$. Characterization of nanoparticles was done via encapsulation efficiency (EE), loading capacity (LC), particle size and zeta potential to optimize the extract concentrations. The antioxidant activity of the nanoparticles was evaluated *in vitro* by 2,2-di-phenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical scavenging assay and ferric reducing antioxidant (FRAP) assay. Data were analyzed using one-way analysis of variance (ANOVA), followed by Tukey's post hoc test.

Results: The maximum EEs, LCs and agreeable PSAs, zeta potential for aqueous (56.66±0.6%, 3.07%, 298.9 nm, -21 mV), 100% ethanol (59.41±1.60%, 1.51%, 131.7 nm, -21.3 mV), 50% ethanol (26.03±0.79%, 1.08%, 191.9 nm, -24.9 mV) and 50% acetone (54.05±0.95%, 2.24%, 262.4 nm, -28.4 mV) were obtained respectively for optimized concentrations. The lowest IC_{50} values, 6.33±0.02 mg/mL for DPPH, 0.24±0.01 mg/ml for the ABTS assay and the highest FRAP value of 40.25±0.70 mg Trolox equivalent/g of extract (mg TE/g) were achieved with 50% ethanol, aqueous, and 50% ethanol extracts encapsulated nanoparticles respectively. The nanoparticles have shown a significant difference comparable to that of trolox ($p<0.05$) ($p=0.00$).

Conclusion: The 50% ethanol and aqueous extracts of *C. grandis* (3-4 mg/mL) encapsulated alginate nanoparticles showed higher antioxidant potential, which could be a promising approach for the formulation of nano drugs

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