ABSTRACT

Centella asiatica (CA, Bao-bog, Pennywort) has been highlighted for its highs phytochemical content, particularly of phenolic compounds. The bioavailability, stability and bioactivity of these compounds can be enhanced by nanoencapsulation. Poly (lactic-co-glycolic) acid (PLGA) nanoparticles containing phenolic extract of CA were synthesized by an adapted emulsion-evaporation method at the ratio (CA-Crude extract : PLGA) 1:2, 1:3, and 1:4 (w/w). The antioxidant activity of CA-PLGA-NPs was evaluated by using DPPH radical scavenging assay, Ferric reducing antioxidant power (FRAP) assay and Total phenolic content (TPC). The modified agar well diffusion method was used to detect the antibacterial activity of CA-PLGA-NPs (100, 200, and 300 µg/mL) against 7 foodborne pathogens. (*Escherichia coli* ATCC25822, *Streptococcus aureus, Bacillus cereus, Bacillus subtilis, Salmonella enterica Typhimurium* U302 (DT104b), *S. enterica Enteritidis* (human), and *S. enterica* 4,5,12:i:- (human) US clone.)

The result from the DPPH and FRAP assay showed, the CA-crude extract has the highest antioxidant value which are 82.66 ± 12.44 µg/mL (IC_{50}) and 2.35 ± 0.53 mmol Fe2+/mg dried weight respectively. However, the highest amount of antioxidant represented by TPC was CA-PLGA-NPs.1:4 (36.22 ± 7.63^{a} µgGAE/mg.) For antibacterial activity, the CA-PLGA-NPs showed 2 – 3 times significantly higher than crude extract. CA-PLGA-NPs 1:3 shown the highest activity and it was significantly affect on gram-positive bacteria *S. aureus* and *B. cereus* (1.02 ± 0.3^{b} and 0.78 ± 0.06^{b} cm.) ($p<0.05$). The entrapment efficiency of CA-PLGA-NPs. rank from high to low were 1:4 ,1:3 and 1:2 respectively (92.61 ± 5.09 %, 63.89 ± 4.13 %, and 30.61 ± 2.41 %) ($p<0.05$). However, CA-crude extracts have the highest solubility (682.89 ± 22.28 µg/mL). CA-PLGA-NPs. also showed stability and releasing of CA in PBS (0.01M, pH 2.0 and pH 7.4). And at pH 7.4 the sample tend to release CA faster, more stable and less time consuming than at pH 2.0. These results indicated that CA-PLGA-NPs provide the promising to increase the bioavailability of CA, which can be developed into the broad spectrum of usage.