

ABSTRACT

Centella asiatica (Bao-bog) is used as a traditional drug widely in Asia. *C. asiatica* crude extracts showed excellent potential *in-vitro* but less or no *in-vivo* activity due to their poor lipid solubility or improper molecular size or both, resulting in poor absorption, poor dosing and poor bioavailability. The Bovine serum albumin (BSA) can attract macromolecular and carry wide variety of molecule. So this research was aimed to develop *C. asiatica* extract-loaded BSA nanoparticles (CBNP) to improve bioavailability. CBNP was prepared by the desolvation method using three different ratio *C. asiatica* crude chloroform extracts: BSA (1:2, 1:3, and 1:4). The well agar diffusion method was used for evaluating antibacterial activity of CBNP with different concentration (100, 200, and 300 µg/ml) against five food borne pathogens (*Escherichia coli* ATCC25822, *Salmonella enterica* Typhimurium U302 (DT104b), *S. enterica* Enteritidis (human), *S. enterica* 4,5,12:i:- (human) US clone, and *Bacillus cereus*). The results showed that the antibacterial activity of CBNP did not show significant different on three different ratio and concentration in all food borne pathogens except *S. enterica* Enteritidis (human) and *B. cereus* ($P < 0.05$). The highest antibacterial active of CBNP was 1.07 ± 0.46 cm against *S. enterica* Enteritidis (human) on ratio 1:4, 200 µg/ml. The antibacterial activity of CBNP gave almost 2 times higher than free crude *C. asiatica* chloroform extracts. The modified Folin-Ciocalteu method, Ferric reducing antioxidant potential assay and DPPH assay were used for evaluating antioxidant activity. The highest antioxidant activity represented by the amount of phenolic content of CBNP was 14.59 ± 6.74 µgGAE/mg using ratio 1:2. The amount of phenolic content of CBNP did not show significant different between ratio 1:2 and others ($P < 0.05$). For Ferric reducing antioxidant potential assay and DPPH assay, crude chloroform extract showed significantly higher activity than CBNP were 1.00 ± 0.15 mmol Fe^{2+} /mg and 29.44 ± 8.20 % DPPH radical scavenging respectively ($P < 0.05$). The entrapment efficiency and loading efficiency of CBNP showed highest

value on ratio 1:4 which were $96.94 \pm 1.48\%$ and $42.05 \pm 5.68\%$ respectively. It's also showed highest in release kinetic *In Vitro* approximately 12% during the whole period of 6 hours in both artificial gastric and intestinal juice. *C. asiatica* crude chloroform extract have higher solubility in water than CBNP but CBNP have higher stability in releasing crude chloroform extract. The results indicated that CBNP showed the promising to increase bioavailability of *C. asiatica*.

Keywords: *Centella asiatica*, Nanoparticles, Bioavailability, Antibacterial, Antioxidant

