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Development and Characterization of Nanovesicles Containing Phenolic Compounds of Carissa spinarum: Encapsulation, Release Kinetics, Antimicrobial Activity and Mathematical Modeling

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Development and Characterization of Nanovesicles Containing Phenolic Compounds of Carissa spinarum: Encapsulation, Release Kinetics, Antimicrobial Activity and Mathematical Modeling

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Abstract

The aim of this study was to develop and characterize a delivery system for polyphenols from an extract of Carissa spinarum leaves, based on liposomes. Liposomes loaded with Carissa spinarum polyphenols (nanoliposomal CsP) were prepared by ethanol-solvent injection method and characterized in terms of zeta potential, size, and polydipersity index by using Zeta sizer and Fourier Transform Infrared spectrum analysis. Total Phenolic content was measured by using Folin-Ciocalteu method and entrapment efficiency was evaluated. The release behavior was conducted in Phosphate Buffer Saline (PBS) solution at pH, 7.4 and Kinetic model fitted to evaluate mechanism of release. Disc diffusion sensitivity test was used to evaluate antimicrobial activity of free extract and nanoliposomal CsP. The mean diameter of nanoliposomal CsP was 181 ± 1.02 nm and had 0.345 ± 0.014 polydipersity index. Zeta potential value for nanoliposomal CsP was-45.6 ± 8.84 mV. Entrapment efficiency under the optimum conditions was 66.11 ± 1.11%. and the nanoliposomal CsP was stable over 30 days. The antibacterial activity of nanoliposomal CsP exhibited inhibition zone diameter of 14.33 ± 1.53 mm and 12.00 ± 1.23 mm against S. aureus and E. coli respectively The results reveal the Carrisa spinarum liposome can be applied as potential carrier for delivery of polyphenols to improves therapeutic action against bacterial strain.

Keywords

Crush injury; electron microscopy; ultrastructural changes; sciatic nerve injury; sensory neurons