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Inorganic Nanocarriers: Surface Functionalization, Delivery Utility for Natural Therapeutics - A Review

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Abstract

In the present study, a chitosan (CS)-coated liposome (LipCsP-Chitosan) nanocarrier was fabricated for the delivery of *Carissa spinarum* (CsP) polyphenols to improve bioavailability and anti-pneumococcal potential against *Klebsiella pneumoniae*. LipCsP-Chitosan was synthesized by the ion gelation method and characterized by using a Malvern zetasizer and Fourier Transform Infrared (FTIR); CsP encapsulation and release kinetics were investigated. Anti-pneumococcal activity of the nanoformulations was accessed by agar-well diffusion and microdilution assays. LipCsP-chitosan exhibited a hydrodynamic size and zeta potential of 365.22 ± 0.70 nm and +39.30 ± 0.61 mV, respectively. CsP had an encapsulation efficiency of 81.5%. FTIR analysis revealed the interaction of the liposomes with chitosan and the CsP. A biphasic CsP release profile followed by a sustained release pattern was observed. LiPCsP-Chitosan presented a higher bioaccessibility of polyphenols in the simulated gastric phase (74.1% ± 1.3) than in the simulated intestinal phase (63.32% ± 1.00). LipCsP-chitosan had a relative inhibition zone diameter of 84.33% ± 2.51 when compared to CsP. At minimum inhibition concentration of 31.25 mg/mL, LipCsP-Chitosan reduced the viability of *Klebsiella pneumoniae* by 57.45% ± 3.76 after 24 h. The results obtained from the current study offer a new approach to the utilization of LipCsP-Chitosan as nanocarriers for candidate anti-pneumococcal agents.