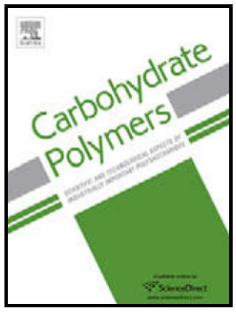

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Improving the stability of thyme essential oil solid liposome by using β-cyclodextrin as a cryoprotectant

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Highlights

1. Solid liposomes containing thyme essential oil were prepared by using β-cyclodextrins as cryoprotectants.
2. The physical and chemical properties of solid liposomes were improved.
3. The solid liposomes possessed favorable antibacterial effects against *E. coli* O157:H7.

Abstract: The objective of this study was to investigate the preparation of the freeze-dried ε-polylysine (ε-PLY)-coated thyme essential oil (TEO) liposome, and its application in vegetable juices to control the *Escherichia coli* O157:H7 growth. Firstly, the solid liposomes (SLP) were obtained via freeze-drying in the presence of β-cyclodextrins as cryoprotectant under different ratios of β-cyclodextrin: lipid (w/w) (2:1, 4:1, 6:1 and 8:1). The ultraviolet visible and fourier transformed infrared spectrograms results indicated the presence of TEO and ε-PLY in SLPs. Subsequently, the morphology, antioxidant activity, digestibility, release rate and phase inversion temperature of SLPs were measured respectively. The SLP powders and re-hydrated SLP solutions exhibited the optimal physical and chemical properties when the ratio of β-cyclodextrin: lipid was 6:1. In addition, SLPs stored at 4°C and 12°C possessed favorable particle size, PDI and zeta potential. Finally, the desired antibacterial effects of SLPs on *Escherichia coli* O157:H7 in 4 vegetable juices were achieved at a concentration of 5 mg/mL.

Key Words: Thyme essential oil; β-cyclodextrin; Solid liposome; Antibacterial effect