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Preparation, characterization and stability studies of phytosterol containing nanoliposomes

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Liposomes are attractive encapsulation systems that provide enhanced stability of encapsulated materials against a range of environmental, enzymatic, and chemical stresses. Substitution of cholesterol with plant sterols (phytosterols) in liposomes structure has attracted great attention due to health effects. Incorporation of phytosterols in liposome structure may also solve the problems related to the direct addition of phytosterols to food products due to their high-melting point and tendency to form insoluble crystals. In this study, a phytosterol mixture (with >70% β-sitosterol) was incorporated into soy phosphatidylcholine vesicles as a substitute for cholesterol. Small unilamellar vesicles (SUV) were prepared using a modified ethanol injection method to entrap cyanocobalamin as a model hydrophilic molecule. Liposomes were prepared using a total lipid concentration of 20 μmol/ml ethanol, injected into 70 mL of distilled water under homogenizer mixing (20,000 rpm), with phospholipid:phytosterol molar ratio of 2:1 and phospholipid:cholesterol molar ratio of 4:1. All of the formulations showed an initial average diameter between 43 to 70 nm, reaching up to 100 nm after 4 weeks storage period at 4 °C. Encapsulation efficiency of phytosterol containing liposomes was found about 45% compared to 52% of cholesterol containing vesicles. Decreased encapsulation efficiency of about 10-15% was observed during 4 weeks storage period. Overall, results of this study indicated stable small size of phytosterol containing liposomes, with acceptable encapsulation efficiency. Therefore, phytosterols can be applied as a substitute for cholesterol to prepare liposomal formulations using ethanol injection method, a simple and easy industrial scale-up method, with good stability and physicochemical properties.

Biography

Shiva Emami is a PhD student of Food Chemistry at University of Tabriz, working currently as a research exchange scholar at University of California Davis, Department of Chemical Engineering and Material Science.

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