LIPOSOMAL STABILIZATION OF SEA BUCKTHORN CAROTENOIDS FOR FUNCTIONAL FOOD APPLICATIONS

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Background: Carotenoids from sea buckthorn *(Hippophae rhamnoides* L.) are valuable lipophilic bioactive compounds known for their strong antioxidant activity and health-promoting properties. However, their application in food systems is often limited by low stability and high susceptibility to oxidative degradation. Liposomal encapsulation represents an effective strategy to protect carotenoids, improve their stability, and enhance their functionality in functional food applications.
The aim of this study was to develop and characterize liposomal formulations encapsulating carotenoids extracted from sea buckthorn (*Hippophae rhamnoides* L.) in order to assess their potential application as functional food ingredients.
Materials and Methods: Liposomal formulations containing sea buckthorn (*Hippophae rhamnoides* L.) carotenoids were prepared in an aqueous medium using an adapted Mozafari method. The obtained systems were characterized by determining encapsulation efficiency and carotenoid retention rate. Antioxidant activity was evaluated using the DPPH radical scavenging assay. Storage stability of the liposomal formulations was assessed over a period of 4 weeks by monitoring the retention of bioactive compounds.
Results: The obtained liposomal formulations showed high encapsulation efficiency (92.0 ± 3.0%) and retention rate (89.2 ± 3.5%), demonstrating effective incorporation of carotenoids into liposomal structures. Encapsulated carotenoids exhibited strong antioxidant activity, with 96.0 ± 1.5% DPPH inhibition. Stability studies indicated that the liposomal systems preserved a significant amount of carotenoids after 4 weeks of storage, confirming their protective effect against oxidative and storage degradation.
Conclusions: These findings confirm that liposomal encapsulation is an efficient delivery system for improving the stability of sea buckthorn carotenoids. The developed formulations show strong potential for application in functional foods, contributing to enhanced bioactive compound retention and improved nutritional value.

Keywords: liposomes; carotenoids; functional foods; bioactive stability

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