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Development of a co-delivery system of betalain and PUFA: Multiple emulsification and microencapsulation by spray drying

Vishnu K V, N S Chatterjee, K K Ajeesh Kumar, R G K Lekshmi and S Mathew
Central Institute of Fisheries Technology, India

There is an increasing evidence of the beneficial effects of several marine lipids in human health, especially polyunsaturated fatty acids, which improve the blood lipid profile and exert anti-inflammatory and cardio protective effects. The high instability of these compounds to oxidative deterioration has a drastic impact on their pharmacokinetics and bioavailability, and this can limit its application in food products. Microencapsulation is one of the promising methods that can minimize oxidative deterioration of omega-3 oils by converting into a stable free-flowing powder. Microencapsulation of omega-3 fatty acids with natural antioxidants can be achieved by using multiple emulsifications, followed by spray drying. In the present study, we aimed to investigate the co-delivery of betalain and PUFA in water in oil in water (w/o/w) multiple emulsions by multiple emulsifications and spray drying. Betalain formed the inner aqueous phase, PUFA formed the oil phase and chitosan-whey protein emulsifier combination formed the outer aqueous phase in a two-step emulsification procedure. The microcapsules obtained by spray drying were subjected to physico-chemical characterization such as microencapsulation efficiency, powder water activity, bulk and amp, tap density, solubility and oxidative stability (peroxide value).

vishnukalladath@gmail.com