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Hempseed oil-based nanoparticles as a potent delivery system for food and pharmaceuticals

Farahnaz Fathordoobady, Yigong Guo and Anubhav Pratap Singh
University of British Columbia, Canada

Research and development of novel designs and formulations for lipid-based nano-carriers for oral delivery systems have impelled growing in applications to pharmaceutical and food industry. Lipid nanoparticles such as liposomes and nano-emulsions present the advantages of less toxicity, high encapsulation efficiency and controlled characteristics. The success of applying these particles for delivery purposes depends on considering some significant factors including formulation constituents and preparation methods. The present study aimed to investigate the potential of lipid nanoparticles based on hempseed oil in ameliorating the delivery characteristics. Hempseed oil (HSO) obtained from Cannabis sativa L. seed with a slight emulsifying properties and ideal ratio of linoleic acid (18:2, ω -6) to alpha-linolenic (18:3, ω -3) fatty acids (2.1 -3.1) for balanced eicosanoid formation related to several physiological reactions, added more emulsifying property and nutritional value to these nanoparticles systems. Two lipid nano-carrier formulations with different combinations of hempseed oil, water and surfactants (lecithin, Poloxamar 188) were developed to provide liposomes and oil in water O/W nano-emulsion. The prepared nano-lipid carriers were characterized by entrapment efficiency (EE%), particle size (nm), zeta potential (mV), in vitro release behavior, Caco-2 cell permeability assays and morphology. Linoleic acid (18:2, ω -6) as the prominent fatty acid present in hempseed oil was selected as a marker for EE%, release tests in simulated Gastro-Intestine (GI) medium as well as permeation assays through Caco-2 cell line. Optimization of condition for preparing liposomes and nano-emulsion resulted in ~99.00% entrapment, <180nm particle size with desire GI release behavior and permeability. We concluded with a successful formulations of hempseed oil-based carriers for delivery purposes.

Biography

Farahnaz Fathordoobady Ph.D. degree in Food Science at University Putra Malaysia in 2016, under the supervising of Professor Md Yazid Abd Manap. My expertise and international background have brought me with extensive working experience. I was a member of National Committees and Boards in Iran. During my study and work at University Pruta Malaysia and Tehran University, I served as a Food Chemistry lab technologist, Lab supervisor, seasonal instructor, and research assistant. I joined the Food Processing and Engineering Lab in April 2018 as a post doctoral fellow focusing on nano and micro-encapsulation as well as in-vitro bioavailability analysis. I have 8 publications and 2 international conference presentations in the field of food matrix and bioactive compounds extraction methods (Supercritical Fluid Extraction), micro-encapsulation, analytical techniques, research methodology.

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