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Optimisation of the production of fish gelatine nanoparticles as a carrier for sunflower-derived biopeptide (Article)

Akbar, I.[a], Jaswir, I.[a,b], Jamal, P.[a]

[a]Bioprocess and Molecular Engineering Research Unit (BPMERU), Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia (IIUM), P.O. BOX 10, Selangor, 50728, Malaysia
[b]International Institute for Halal Research and Training (INHART), International Islamic University Malaysia (IIUM), Jalan Gombak, Selangor, 53100, Malaysia

Abstract

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Gelatine obtained from fish skin has become a potential source of preparing nanoparticles and encapsulation of bioactive compounds. Within these fish skin, gelatine nanoparticles show potent benefits for application in pharmaceutical and cosmetic industry. The encapsulated bioactive ingredients within nanoparticles have improved bioavailability, delivery properties, and solubility of the nutraceuticals within the human body and blood stream. Many of such bioactive peptides (biopeptides) are potent antioxidants; and as oxidative stress is the main cause of the onset of various chronic diseases, encapsulation of antioxidant biopeptides within fish gelatine nanoparticles could be a potential remedy to prevent or delay the onset of such diseases and for better health prospects. The purpose of the present work was to prepare a simple, safe, and reproducible novel food delivery nanoparticle system encapsulating a desirable antioxidant biopeptide . An optimisation study was conducted to produce a desirable size of gelatine nanoparticles which showed a higher encapsulation efficiency of an antioxidant biopeptide . Sunflower biopeptide was chosen as the antioxidant biopeptide , as the activity of this protein hydrolysate is quite high at DPPH of 89% and FRAP assay of 968 µm/L. Tilapia fish was used as gelatine source at an average yield of the process at 10% wt/wt. Effects of parameters such as pH, biopeptide concentration, and cross-linking agent 'glutaraldehyde' on the size, stability, and encapsulation efficiency on the nanoparticles were studied. The average diameter of the biopeptide loaded gelatine nanoparticle was between 228.3 and 1,305 nm. Encapsulation efficiency was 76% at an optimal pH of 2, glutaraldehyde concentration of 2 mL, and biopeptide concentration of 0.1 mg/mL exhibited DPPH at 92% and FRAP assay of 978 µm/L. To understand the absorption of sunflower biopeptide in stomach, blood stream, and biopeptide release of the gelatine nanoparticles , biopeptide loaded gelatine nanoparticles were subjected to simulated gastrointestinal conditions mimicking human stomach and intestine; and showed peptide release of 0.1464 and 0.277 mg/mL upon pepsin and pancreatin digestion, respectively.

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Topic: Human Serum Albumin | Gelatins | Nanocarriers

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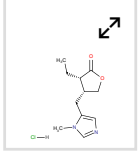
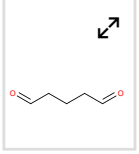
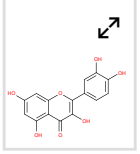
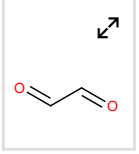
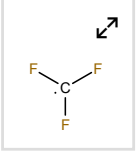
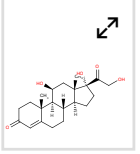

Author keywords

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