

CHARACTERISATION AND ANTICANCER ACTIVITY OF WHEAT BRAN PHENOLIC EXTRACT-LOADED CHITOSAN NANOPARTICLES

PANWAR Richa, VASHISTH Priya, SHARMA Asvene Kumar, PRUTHI Vikas

Indian Institute of Technology Roorkee, Roorkee, Haridwar, India

Abstract

In our investigation phenolic acids extract from wheat bran was encapsulated in chitosan tripolyphosphate (CS-TPP) nanoparticles and tested for their antioxidant potential and anticancer activity against NCI-H460lung cancer cell lines. The extract analysed using RP-HPLC was found to be consisting mainly of ferulic, p-coumaric, vanillic and caffeic acid. Nanoparticles were prepared by ionic gelation method and different mass ratios of CS -TPP were tested for their effect on zeta potential, mean diameter of phenolic extract-chitosan nanoparticles and their entrapment efficiencies. Data showed that maximum entrapment efficiency of 53% was obtained at 2:1 CS-TPP mass ratio. The average diameter of appreciably spherical loaded nanoparticles as observed by FESEM was recorded to 161.2 nm in size exhibiting zeta potential value of 14.2 mV. Interaction between the phenolic acids extract and CS-TPP nanoparticles was established with Fourier transform infrared spectrum (FTIR) and physical state was analysed using differential scanning calorimetry (DSC). When tested for free radical scavenging activity, both free phenolic acid extract and the extract-loaded chitosan nanoparticles showed concentration-dependent activity, however, the activity was higher for nanoparticles. Similarly, the cytotoxicity of nanoparticles against cancerous cell lines was potentially enhanced as compared to free phenolic extract. Thermal oxidation profile obtained by differential scanning calorimetry indicated that the encapsulated extract remained intact at high temperatures whereas the free phenolic acid extract was oxidized. The results showed that encapsulation of wheat bran phenolic acid extract in CS-TPP nanoparticles could serve as a novel approach to utilize agricultural wastes for value added therapeutic agent.

Keywords: Wheat bran, nanoparticles, cytotoxicity, chitosan

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