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CHITOSAN-COATED MAGNETITE NANOPARTICLES LOADED WITH POLAR EXTRACTS OF *OSBECKIA OCTANDRA* LEAF

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Targeted drug delivery improves drug bioavailability and safety, particularly in cancer chemotherapy. When drug-loaded magnetite nanoparticles (MNPs) are employed, the rate of drug release can be controlled by an external magnetic field. The present study aims to synthesize chitosan-coated magnetite nanoparticles (CMNPs) loaded with leaf extracts of *Osbeckia octandra*; chitosan, a linear copolymer polysaccharide derived from chitin, confers biocompatibility to magnetic nanoparticles. The plant *O. octandra*, which is endemic to Sri Lanka, is known for its anticancer, antidiabetic, and hepato-protective properties. The dry leaf powder of *O. octandra* was extracted sequentially with hexane, dichloromethane, methanol, and water using Soxhlet extraction. The antioxidant capacity of the sequential extracts was determined using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging and ferric reducing antioxidant power (FRAP) assays; antioxidants prevent free radical damage associated with cancer development. To evaluate the toxicity of the extracts toward healthy cells, the extracts were subjected to *in vitro* cell viability studies on Vero 76 cells. The polar extracts (methanol and water) displayed the highest antioxidant capacity comparable to that of ascorbic acid and the highest cell viability (100%) on Vero 76 cells. Accordingly, the methanol and water extracts were treated with CMNPs to obtain the corresponding extract-loaded nanoparticles, MCMNPs and WCMNPs, respectively; MNPs were prepared by the co-precipitation method and CMNPs by surface coating of MNPs with chitosan. The presence of magnetite in each type of magnetic nanoparticles was confirmed by powder X-ray diffractometry and Fourier transforms infrared (FTIR) spectroscopy. Scanning electron microscopy revealed the average particle size of MNPs, CMNPs, MCMNPs, and WMNCPs as 34.19±9.34, 32.67±7.21, 42.89±8.73, and 41.49±8.21 nm, respectively. The incorporation of chitosan into CMNPs was indicated by FTIR, and thermogravimetric analysis (TGA) revealed that 20.4% of the MNP was coated with chitosan. Methanol and water extracts were loaded onto CMNPs with encapsulation efficiencies of 81% and 70%, respectively.

Keywords: Chitosan, Magnetite, Nanoparticles, *Osbeckia octandra*, Targeted drug delivery