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Optimization of solid lipid nanoparticles prepared by microemulsion dilution for microencapsulation of bioactive compounds from red cabbage

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Anthocyanins are the main polyphenol components in extract of fresh red cabbage (Brassica oleracea) with inherent anti-oxidant activity. To protect them against harsh environmental conditions (e.g. pH and temperature), solid lipid nanoparticles were prepared by dilution of w/o microemulsion containing anthocyanins, in aqueous media. The formulations were characterized regarding particle size and encapsulation efficiency. The formulation parameters (e.g. % total lipid, volume of internal aqueous phase, homogenization time, % total surfactant, % stabilizer) were optimized by Placket-Burman and Box-Behnken experimental designs. The highest value of EE (89%) was obtained when mean particle size was 6 microns and the lowest particle size (417 nm) was achieved while EE value was 35.8%. SEM study revealed a spherical morphology of the particles.

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Solid lipid nanoparticles for the treatment of colorectal cancer

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Site specificity of anti-neoplastics still poses a challenge in the pharmaceutical research. Conventional chemotherapy has limitations such as site in-specificity, inability of the drug to penetrate inside the tumor, adverse effects there by reducing the clinical application. So, in this study oxaliplatin solid lipid nanoparticles (OP-SLN) were prepared by micro emulsion method using various ratios of lipid and then covalently conjugated to TRAIL monoclonal antibody (TR-OP-SLN) for targeting colorectal cancer cells by receptor mediated internalization of drug. The prepared immuno nanoparticles were characterized for Fourier Transform Infrared spectroscopy (FT-IR), Differential scanning calorimetry (DSC), X-ray diffraction (XRD), particle size, scanning electron microscopy (SEM), surface charge, fluorescence intensity and in vitro drug release. These were further characterized for in vitro cytotoxicity (in HT-29 cells) followed by cellular uptake and internalization by flow cytometry along with protein assay. The optimized OP-SLN3 has shown an appreciable particle size (121±1.22 nm), entrapment efficiency (78±0.09%), drug loading (32±1.01%) along with spherical surface morphology. TR-OP-SLN has shown a drug release of 81±0.01% and 27±0.12% at pH 4.5 and 7.4 respectively further confirming its ability to release the drug inside the tumor. Fluorescence study confirmed the presence of the antibody on the surface of the nanoparticles by change in their intensity. A 1.5 fold increase in cytotoxicity of immuno nanoparticles (7.5 ug/ml or more) was observed. Cellular uptake studies have shown 89% of immuno nanoparticles uptake by the cells and immuno nanoparticle are majorly internalized in the perinuclear region. In conclusion, we demonstrate a preparation and characterization of oxaliplatin immuno nanoparticles for receptor mediated targeting of the drug.

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