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Synthesis and characterization of desferrioxamine entrapped PEO/ethyl cellulose nano-hybrids

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Repetitive transfusion of blood as a treatment for thalassemia poses serious health problems in patients by raising the blood iron concentration to abnormal levels, which is called iron overload disease (IO). In order to minimize the IO condition, the drug desferrioxamine (DFO) is administrated slowly via a subcutaneous injection. However, the unavailability of the oral form of the medication and the need for subcutaneous infusion for long hours have markedly limited its use. Therefore, it is imperative to move towards orally administered management model for IO. The main objective of the current study is to synthesize and characterize polyethylene oxide-ethyl cellulose nanoparticles (PEO-EC) for the purpose of loading DFO. PEO-EC nanoparticles were synthesized using desolvation method in the presence of PEO, Tween 80 (0.2% − 0.4%)/aqueous system and EC/ethyl acetate organic phase. Synthesized particles were characterized using scanning electron microscope (SEM), particle size analyzer and Fourier transform infrared spectrometer (FTIR). The appearance of the prominent sharp stretching band of N-H amine in the region 3294 cm^{-1} − 3390 cm^{-1} confirms the entrapment of DFO in PEO-EC nanoparticles. The SEM micrographs of the synthesized particles confirm the presence of spherical shape morphology. PSA data reveals the formation of average 106 nm (PDI: 0.795) particles (Tween 80: 0.4%, PEO: 0.1 g). UV-Vis spectroscopic analysis data at 410 nm revealed DFO entrapment efficiency of 5.5 − 6 % with 27.3 − 30 mg/g loading capacity. Hence, these results show a promising approach for the use of PEO-EC nanoparticles for the development of orally administered model for IO.

Key words: desferrioxamine, drug loading, polyethylene oxide, ethyl cellulose

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