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In vitro and *in vivo* assessment of alginate/chitosan nanoparticles for oral delivery of enoxaparin

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The objective of present research work was to develop alginate coated chitosan core shell nanoparticles (Alg-CS-NPs) for oral delivery of low molecular weight heparin, enoxaparin. Chitosan nanoparticles (CS-NPs) were synthesized by ionic gelation of chitosan using sodium tripolyphosphate. Core shell nanoparticles were prepared by coating CS-NPs with alginate solution under mild agitation. The Alg-CS-NPs were characterized for surface morphology, surface coating, particle size, polydispersity index, zeta potential, drug loading and entrapment efficiency using SEM, TEM, Zeta-sizer, FTIR and DSC techniques. The performance of optimized enoxaparin loaded Alg-CS-NPs was evaluated by *in vitro* drug release studies, *in vitro* permeation study across intestinal epithelium, *in vivo* venous thrombosis model, particulate uptake by intestinal epithelium using fluorescence microscopy and pharmacokinetic studies in rats. Coating of alginate over the CS-NPs improved the release profile of enoxaparin from the nanoparticles for successful oral delivery. The Alg-CS-NPs significantly increased ($p<0.05$) the oral bioavailability of enoxaparin in comparison to plain enoxaparin solution. The core shell Alg-CS-NPs showed promising potential for oral delivery and significantly enhanced the *in vivo* oral absorption of enoxaparin.

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