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Silymarin Loaded Mesoporous Silica Nanoparticles: Preparation, Optimization, Pharmacodynamic and Oral Multi-Dose Safety Assessment

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Abstract : The present work aimed to prepare Silymarin loaded MCM-41 type mesoporous silica nanoparticles (MSNs) and to assess the system's solubility enhancement ability on the pharmacodynamic performance of Silymarin as a hepatoprotective agent. MSNs prepared by soft-templating technique, were loaded with Silymarin, characterized for particle size, zeta potential, surface properties, DSC and XRPD. DSC and specific surface area data confirmed deposition of Silymarin in an amorphous state in MSNs' pores. In-vitro drug dissolution testing displayed enhanced dissolution rate of Silymarin upon loading on MSNs. High dose Acetaminophen was then used to inflict hepatic injury upon albino male Wistar rats simultaneously receiving either free Silymarin, Silymarin loaded MSNs or blank MSNs. Plasma AST, ALT, albumin and total protein and liver homogenate content of TBARs or LDH as measures of antioxidant drug action were assessed for all animal groups. Results showed a significant superiority of Silymarin loaded MSNs to free drug in almost all parameters. Meanwhile prolonged administration of blank MSNs had no evident toxicity on rats.

Keywords : mesoporous silica nanoparticles, safety, solubility enhancement, silymarin
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