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Hepatoprotective Effects of Curcumin Nanoformulations in Drug-Induced Liver Injury Models

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Objectives: This study investigates the hepatoprotective efficacy of curcumin nanoformulations against drug-induced liver injury, focusing on enhanced bioavailability and antioxidant capacity.

Material and methods: Curcumin nanoparticles were synthesized using a solvent evaporation technique and characterized for size, stability, and encapsulation efficiency. Liver injury was induced in rats using acetaminophen overdose. Treatment groups received standard curcumin or nano-curcumin (20, 40, and 80 mg/kg) orally for seven days. Blood samples and liver tissues were analyzed for biochemical markers (ALT, AST, ALP, bilirubin) and oxidative stress parameters (MDA, SOD, GSH). Histopathological assessments were performed to evaluate tissue-level protection.

Results: Nano-curcumin significantly restored biochemical markers to near-normal values and improved antioxidant enzyme activity compared to standard curcumin. Histological analysis showed reduced necrosis, inflammation, and fatty degeneration in treated groups. Improved bioavailability of nano-curcumin was confirmed through pharmacokinetic evaluation.

Conclusion: Curcumin nanoformulations demonstrate superior hepatoprotective effects and represent a promising therapeutic strategy for managing drug-induced liver injury.

Biography

Dr. Arvind K. Subramanian is an associate professor of Pharmacology at the National Institute of Pharmaceutical Education and Research (NIPER), Hyderabad, India. His research focuses on nanomedicine development, natural product pharmacology, and hepatoprotective drug discovery. Over the past decade, he has contributed to advancing nanoformulation technologies aimed at improving therapeutic performance and bioavailability of plant-derived compounds. Dr. Subramanian has authored multiple peer-reviewed articles, supervised postgraduate research, and collaborated with biotechnology startups to promote translational applications of nano-herbal therapeutics. His work continues to support innovative solutions for drug-induced liver injury and metabolic liver disorders

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