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Anticancer potential and pharmacological evaluation of artemisinin as silica-based nanomedicine

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Nanoparticle mediated therapy has been established to be more effective than conventional chemotherapy in various cancers. Present study aimed to explore the anticancer potential of mesoporous silica nanoparticles (MSNPs) loaded with artemisinin. MSNPs were synthesized, characterized, loaded with artemisinin and coated with PEG to generate targeted drug delivery system. XRD, FTIR, UV-Vis spectroscopy and SEM showed generic properties of MSNPs, rendering them suitable for drug delivery. Dimethyl sulfoxide (DMSO) was found to be a suitable solvent as compared to methanol. *In-vitro* antioxidant, antibacterial and hemolytic assays showed better efficacy of nanomedicine as compared to artemisinin or nanoparticles alone. Safety of normal cells by nanomedicine was ensured by analysis of lymphocyte toxicity using MTT assays. Benzene was used to induce leukemia in Sprague-Dawley rats. Hematological profiling, morphological evaluation of blood cells, hepatic biomarker analysis and estimation of anti-oxidant enzymes of liver and kidney in leukemic rats showed the enhanced efficacy of nanomedicine. It showed significant impact on cellular indicators as compared to leukemic conditions. The blood counts of leukemic rats were improved; hepatic biomarkers and antioxidant enzymes also depicted marked improvement in the treated group. We conclude that artemisinin loaded MSNPs help in countering benzene-induced hepatic and renal toxicity and improve blood cell morphology and WBC counts in leukemic rats.

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