Development, Characterization and Antimalarial Efficacy of Dihydroartemisinin Loaded Solid Lipid Nanoparticles.

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Abstract

Effective use of dihydroartemisinin (DHA) is limited by poor water-solubility, poor pharmacokinetic profile and unsatisfactory clinical outcome especially in monotherapy. To reduce such limitations, we reformulated DHA into solid lipid nanoparticles (SLNs) as a nanomedicine drug delivery system. DHA-SLNs were characterized for physical parameters and evaluated for in vitro and in vivo antimalarial efficacy. DHA-SLNs showed desirable particle characteristics including particle size (240.7 nm), particle surface charge (+17.0 mV), drug loadings (13.9 wt %), encapsulation efficacy (62.3%), polydispersity index (0.16) and a spherical appearance. Storage stability up to 90 days and sustained release of drug over 20 h was achieved. Enhanced in vitro (IC50 0.25 ng/ml) and in vivo (97.24% chemosuppression at 2mg/kg/day) antimalarial activity was observed. Enhancement in efficacy was 24% when compared to free DHA. These encouraging results show potential of using the described formulation for DHA drug delivery for clinical application.

FROM THE CLINICAL EDITOR:

Malaria still poses a significant problem worldwide. One of the current drugs, artemisinin has been shown to be effective, but has poor water-solubility. The authors here described their formulation of making dihydroartemisinin (DHA) into solid lipid nanoparticles, with subsequent enhancement in efficacy. These results would have massive potential in the clinical setting.

KEYWORDS: Dihydroartemisinin; Nanomedicine drug delivery; Solid lipid nanoparticles