Characterization and toxicity of citral incorporated with nanostructured lipid carrier

ABSTRACT

The nanoparticle as a cancer drug delivery vehicle is rapidly under investigation due to its promising applicability as a novel drug delivery system for anticancer agents. This study describes the development, characterization and toxicity studies of a nanostructured lipid carrier (NLC) system for citral. Citral was loaded into the NLC using high pressure homogenization methods. The characterizations of NLCcitral were then determined through various methods. Based on Transmission Electron Microscope (TEM) analysis, NLC-Citral showed a spherical shape with an average diameter size of 54.12 ± 0.30 nm and a polydipersity index of 0.224 ± 0.005. The zeta potential of NLC-Citral was −12.73 ± 0.34 mV with an entrapment efficiency of 98.9 ± 0.124%, and drug loading of 9.84 ± 0.041%. Safety profile of the formulation was examined via in vitro and in vivo routes to study its effects toward normal cells. NLC-Citral exhibited no toxic effects towards the proliferation of mice splenocytes. Moreover, no mortality and toxic signs were observed in the treated groups after 28 days of treatment. There were also no significant alterations in serum biochemical analysis for all treatments. Increase in immunomodulatory effects of treated NLC-Citral and Citral groups was verified from the increase in CD4/CD3 and CD8/CD3 T cell population in both NLC-citral and citral treated splenocytes. This study suggests that NLC is a promising drug delivery system for citral as it has the potential in sustaining drug release without inducing any toxicity.

Keyword: Nanostructured lipid carrier; Citral; Toxicity; Characterization