ABSTRACT

The Effect of Ursolic Acid Niosome Coated with Chitosan on Cellular Uptake and Cytotoxicity

Berlian Sarasitha Hariawan

Ursolic acid (UA) has been reported to be effective for hepatocellular carcinoma therapy. UA has hepatoprotective effects against liver injury; however, it has low water solubility and permeability limiting its therapeutic effects. Niosomes were proposed to be the carrier with chitosan addition intended to increase the cellular uptake, thus improving its efficacy. This study aimed to evaluate the effects of chitosan coating on the cellular uptake and cytotoxicity of niosomes loaded ursolic acid. Niosomes composed of Ursolic acid, Span 80, and cholesterol were prepared by thin-layer method. The cellular uptake study was then evaluated for 2 hours drug incubation on HeLa cells and the results was observed under a fluorescence microscope. The cytotoxicity was further evaluated by MTT assay on HeLa and huh7it cells for 48 hours. The results showed that the addition of chitosan increased the particle sizes, which was from 198,7±13,8 nm nm to 237,7 ± 6,2, and ζ-potentials, which were of -57,50 ± 11,87 mV to 3,88 ± 1,55 mV. The niosomes loaded ursolic acid with chitosan layers had higher IC_{50} in HeLa cells than without chitosan, which were 12,904 μg/mL and 10,938 μg/mL, respectively. On the other hand, the study on Huh7it cells revealed that the addition of chitosan into niosomes resulted in low cytotoxicity. There was no significant improvement on the cellular uptake of niosomes with the chitosan addition; however niosomes with chitosan layers had relatively higher fluorescence intensity than that of without chitosan. In addition, cell pre-treatment with sucrose inhibited niosomal cellular uptake, which may indicate that clathrin-mediated endocytosis has an important role in the cellular transport of niosomes. In conclusion, it can be suggested that the addition of chitosan layers increased the particle size and ζ-potentials and improved cellular uptake and cytotoxicity in the HeLa cells.

Keywords: ursolic acid, niosom, chitosan, cytotoxicity, IC_{50}, cellular uptake