Cytoprotective and enhanced anti-inflammatory activities of liposomal piroxicam formulation in lipopolysaccharide-stimulated RAW 264.7 macrophages

ABSTRACT

BACKGROUND: Liposomal drug delivery systems, a promising lipid-based nanoparticle technology, have been known to play significant roles in improving the safety and efficacy of an encapsulated drug. METHODS: Liposomes, prepared using an optimized proliposome method, were used in the present work to encapsulate piroxicam, a widely prescribed nonsteroidal anti-inflammatory drug. The cytotoxic effects as well as the in vitro efficacy in regulation of inflammatory responses by free-form piroxicam and liposome-encapsulated piroxicam were evaluated using a lipopolysaccharide-sensitive macrophage cell line, RAW 264.7. RESULTS: Cells treated with liposome-encapsulated piroxicam demonstrated higher cell viabilities than those treated with free-form piroxicam. In addition, the liposomal piroxicam formulation resulted in statistically stronger inhibition of pro-inflammatory mediators (ie, nitric oxide, tumor necrosis factor-α, interleukin-1β, and prostaglandin E2) than piroxicam at an equivalent dose. The liposome-encapsulated piroxicam also caused statistically significant production of interleukin-10, an anti-inflammatory cytokine. CONCLUSION: This study affirms the potential of a liposomal piroxicam formulation in reducing cytotoxicity and enhancing anti-inflammatory responses in vitro.

Keyword: Liposomes; Nitric oxide; Cytokines; Prostaglandin E2; Interleukin-1β; Piroxicam