In vitro release and cytotoxicity study of encapsulated sulfasalazine within LTSP micellar/ liposomal and TSP micellar/niosomal nano-formulations

ABSTRACT

The micelles/liposome formulation for the first time has been constructed via thin-film hydration method containing soy lecithin (L), tween 80 (T), squalene (S), and polyvinyl alcohol (P) (LTSP nanoparticles). Similar ingredients except for lecithin were used for preparing micellar/niosomal vesicular SSZ nanoformulation (TSP nanoparticles). The percent drug loading and encapsulation efficiency of SSZ was 7.39% and 98.5 ± 0.3 % for the 7.5:100 (w/w) ratio of SSZ: total weight of LTSP, while the percent drug loading and encapsulation efficiency of SSZ was 4.7% and 62.85 ± 0.3 % in the TSP nanoformulation. Dynamic light scattering (DLS) and trans- mission electron microscopy (TEM) results showed that both formulations formed spherical micelles and vesicles with globule sizes of 25 ± 1.2 nm and 100 ± 20.5 nm respectively. The cell toxicity evaluations showed that both LTSP and TSP nanoformulations without drug were nontoxic (at the range of this experiment) for Human Dermal Fibroblasts (HDF) as a normal cell line but SSZ loaded nanoformulation exhibited increased cell toxicity with half-maximal inhibitory concentration (IC50) of 940 mM for SSZ alone to near 240 mM for SSZ loaded nanoformulation (approximately four times). In vitro release experiments exhibited sustained release of SSZ from both nanoformulations. The LTSP micellar/liposomal and TSP micellar/niosomal nanoformulation for SSZ delivery can be considered as appropriate approaches for improving its bioavailability and probably they are good candidates for future clinical investigations.