

**Thymoquinone-loaded nanostructured lipid carrier exhibited cytotoxicity towards breast cancer cell lines (MDA-MB-231 and MCF-7) and cervical cancer cell lines (HeLa and SiHa)**

ABSTRACT

Thymoquinone (TQ) has been shown to exhibit antitumor properties. Thymoquinone-loaded nanostructured lipid carrier (TQ-NLC) was developed to improve the bioavailability and cytotoxicity of TQ. This study was conducted to determine the cytotoxic effects of TQ-NLC on breast cancer (MDA-MB-231 and MCF-7) and cervical cancer cell lines (HeLa and SiHa). TQ-NLC was prepared by applying the hot high pressure homogenization technique. The mean particle size of TQ-NLC was  $35.66 \pm 0.1235$  nm with a narrow polydispersity index (PDI) lower than 0.25. The zeta potential of TQ-NLC was greater than  $-30$  mV. Polysorbate 80 helps to increase the stability of TQ-NLC. Differential scanning calorimetry showed that TQ-NLC has a melting point of  $56.73^{\circ}\text{C}$ , which is lower than that of the bulk material. The encapsulation efficiency of TQ in TQ-NLC was  $97.63 \pm 0.1798\%$  as determined by HPLC analysis. TQ-NLC exhibited antiproliferative activity towards all the cell lines in a dose-dependent manner which was most cytotoxic towards MDA-MB-231 cells. Cell shrinkage was noted following treatment of MDA-MB-231 cells with TQ-NLC with an increase of apoptotic cell population ( $P < 0.05$ ). TQ-NLC also induced cell cycle arrest. TQ-NLC was most cytotoxic towards MDA-MB-231 cells. It induced apoptosis and cell cycle arrest in the cells.