

## Characterisation of sol–gel method synthesised MgZnFe<sub>2</sub>O<sub>4</sub> nanoparticles and its cytotoxic effects on breast cancer cell line, MDA MB-231 *in vitro*

### ABSTRACT

In this study, nanocrystalline magnesium zinc ferrite nanoparticles were successfully prepared by a simple sol–gel method using copper nitrate and ferric nitrate as raw materials. The calcined samples were characterised by differential thermal analysis/thermogravimetric analysis, Fourier transform infrared spectroscopy and X-ray diffraction. Transmission electron microscopy revealed that the average particle size of the calcined sample was in a range of 17641 nm with an average of 29 nm and has spherical size. A cytotoxicity test was performed on human breast cancer cells (MDA MB-231) and (MCF-7) at various concentrations starting from (0 µg/ml) to (800 µg/ml). The sample possessed a mild toxic effect toward MDA MB-231 and MCF-7 after being examined with MTT (3-[4, 5-dimethylthiazol-2-yl]-2, 5 diphenyltetrazolium bromide) assay for up to 72 h of incubation. Higher reduction of cells viability was observed as the concentration of sample was increased in MDA MB-231 cell line than in MCF-7. Therefore, further cytotoxicity tests were performed on MDA MB-231 cell line.

**Keyword:** MgZnFe<sub>2</sub>O<sub>4</sub> nanoparticles; Sol–gel method; Drug-delivery carrier; Breast cancer cell line