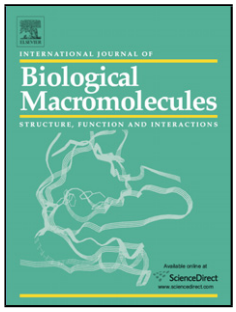

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Anticancer activity of silver and copper embedded chitin nanocomposites against human breast cancer (MCF-7) cells

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Abstract

Chitin is a natural biopolymer widely used in biomedical and environmental applications due to its distinctive physical, chemical and mechanical properties. Although the anticancer property of chitin nanoforms and chitin derivatives against various cancers were studied earlier, there is no report in the chitin nanostructure incorporated metal nanocomposite. The present study was aimed to investigate the cytotoxicity of chitin incorporated silver and copper nanocomposite against human breast cancer (MCF-7) cells. Cytotoxicity of chitin nanoparticles (CNP), silver nanoparticles (AgNP), copper nanoparticles (CuNP), chitin/silver nanocomposite (CNP/AgNP) and chitin/copper nanocomposite (CNP/CuNP) was evaluated. Among all the above, CNP/AgNP has shown a lower of 31 µg as inhibitory concentration (IC_{50}) value. Our study further showed the increased generation of reactive oxygen species with decreased activity of antioxidant enzymes and damage in the membrane integrity, thus confirms the cellular cytotoxic action of CNP/AgNP. In conclusion, the present study validates that, incorporating chitin nanoparticles with metallic nanostructure could be an effective and promising therapeutic agent against breast cancer.

Abbreviations: AgNP- silver nanoparticles; CuNP- copper nanoparticles; CNP/AgNP – chitin/silver nanocomposite; CNP/CuNP – chitin/copper nanocomposite; SOD – superoxide dismutase; ROS – reactive oxygen species.

Keywords: chitin; silver; copper; nanocomposite; MCF-7; cytotoxicity

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