

Antimicrobial effects of red algae extract on Caspian coast (*Gracilaria gracilis*) and its effect on expression of Bax, Bcl2 and β -actin genes in abnormal cells

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Introduction: In recent years, the use of AgNPs (AgNPs) has attracted particular interest due to its anti-angiogenic, antibacterial and anti-cancer activities. The aim of this study was to investigate the compounds and antibacterial effect of *G. gracilis* red algae extract and silver nanoparticle synthesis using this algae and to evaluate its toxicity on P53 prostate cancer cell lines. **Materials and Methods:** In this study, algal extract compounds were identified by gas chromatography-mass spectrometry (GC / MS). The biosynthesis of silver nanoparticles was performed by *G. gracilis* algae extract. The silver nanoparticles were confirmed by XRD, FE-SEM electron microscopy and EDS. P53 prostate cancer cell lines were treated with different concentrations of silver nanoparticles for 48 h. Cell viability and 50% lethal dose (IC50) were evaluated by MTT assay. Expression of Bax and Bcl-2 genes was also assessed by RT-PCR. **Results:** Investigation of nanoparticle properties by electron microscopy showed that the nanoparticles were between 12 and 46 nm in size. Silver nanoparticles were able to inhibit standard bacteria and even antibiotic-resistant bacteria and were more potent than red algae extract. MTT assay showed that silver nanoparticles inhibited P53 cell growth in a dose-dependent manner. Gene expression results revealed that Bax and Bcl-2 gene expression were up-regulated and down-regulated, respectively. **Conclusion:** The results of this study showed that silver nanoparticles have antibacterial and anticancer activities and can be considered as a promising strategy in the treatment of cancer.

Keywords : Silver nanoparticles, *G.gracilis*, Antibacterial, Anti-cancer

