

Calculation of toxicity of aqueous and organic extracts of *Gracilaria gracilis* red algae

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Abstract—Cancer is on the rise around the world and is therefore a major health threat worldwide. Along with the global increase in the incidence of breast cancer, in Iran, there is an upward trend in the annual incidence of this cancer. Medicinal plants are one of the most important sources of anti-cancer compounds. Marine algae is an important source of bioactive metabolites for the pharmaceutical industry in drug development. And every year new studies are done in this direction and valuable results are obtained. *Gracilaria gracilis* is a large red algae. *Gracilaria gracilis* species are important for industrial and biotechnological applications because they contain phycocloids, which are the main source of α - (1,4) -3,6-anhydro-l-galactose agar and β - (1,3) agar -d- are galactose. *Gracilaria gracilis* is found in warm waters around the world, although it is also found seasonally in temperate waters. Therefore, more comprehensive research is needed to exploit the biological potential of this large algae and its highly valuable products. Due to this, in this study, the cytotoxic effect of aqueous and organic extracts of *Gracilaria gracilis* red algae on MDA-MB-231 human breast cancer cells was investigated. First, aqueous and organic extracts of large biomass of *Gracilaria gracilis* algae were prepared by solvent soaking method and MDA-MB-231 breast cancer cell line was cultured in DMEM medium with 10% fetal bovine serum. The cytotoxic effect of different concentrations of coarse algae (including 300, 500 and 700 $\mu\text{g} / \text{ml}$) was measured by dimethyltetrazolium bromide (MTT) at 48 and 72 hours and the IC₅₀ of the extracts was calculated at these times. The results showed that aqueous and hexane extracts decreased the growth of cancer cells by increasing the concentration and treatment time and the ic₅₀ of these extracts were $16 \cdot \cdot 39 \pm 25.52$ and 1003.84 ± 41.05 , respectively. As a result, the cytotoxic effect of aqueous and elongated extracts of *Gracilaria gracilis* red algae is effective and can be used to identify anti-cancer compounds, and the extract of this large red algae can also be used in medicine and food.

Keywords— *Gracilaria gracilis*, MTT assay, Marine algae, breast cancer, macroalgae

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