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Cytotoxic effect of ethanolic extract of *Aloe castellorum* on human breast carcinoma MCF-7 cells

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Abstract

Cancer is the world's most serious disease. New and safe anticarcinogens can be found in natural products. *Aloe castellorum* is an Aloe plant species native to Saudi Arabia. In the present study, the cytotoxic activity of the methanol extract of *Aloe castellorum* leaves was evaluated using breast adenocarcinoma cells (MCF-7), assessed by sulforhodamine B (SRB) cell viability assays. The results indicate that the *Aloe castellorum* showed weak cytotoxic effects against tested cancer cell lines, with an IC_{50} value of 341µg/ml. In conclusion, the in vitro cytotoxic evaluation of *Aloe castellorum* showed low cytotoxicity on MCF-7 cell line.

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Introduction

Breast cancer affects women all over the world more than any other form of cancer. After lung cancer, breast cancer is the second leading cause of mortality (Ferlay *et al.*, 2015). Breast cancer accounts for 28.7% of all newly diagnosed cancers in Saudi women, which makes it the most prevalent cancer in Saudi Arabia (Ibrahim *et al.*, 2008). Current constraints in cancer treatment include toxic effects and tumor resistance to chemotherapeutic agents. Therefore, finding new and more effective treatment options is considered a priority (Gordaliza, 2007). Plant extracts are rich in compounds such as flavonoids and polyphenols, which play an important role in drug discovery and development (Newman and Cragg, 2012). *Aloe castellorum* is an Aloe plant species native to Saudi Arabia. Several studies indicate that certain species of *Aloe* have antioxidant and anti-carcinogenic properties (Majumder *et al.*, 2019). Therefore, this study aimed to investigate the cytotoxic effect of the methanolic extract of *Aloe castellorum* against human breast carcinoma MCF-7 cells.

Materials and methods

Plant Material and Extraction

Samples of the *Aloe castellorum* were collected in August 2020 from the Albaha region of Saudi Arabia. The authenticity and identification of the plant were made by taxonomist Abdulwali Al-Khulaidi, Department of Biology, University of Albaha.

The plant samples were dried in a vacuum oven at 40 Co for 72 h and then ground with a mortar and pestle, which were extracted with 70 % methanol (3 × 60 mL fresh solvent, 30 min ultrasonic each). Then, the mixture was filtered and the extract was collected and evaporated under vacuum at 50°C.

Cancer cell culture

Human breast carcinoma cells (MCF-7) were received from Nawah Scientific Inc. (Egypt) and stored in the laboratory. Cell lines were cultured in a DMEM medium containing 100 mg/mL streptomycin, 100 U/mL penicillin and 10% FBS at 37°C in an incubator humidified with 5% CO 2.

SRB assay

The viability of the cells was assessed by colorimetric sulphorhodamine-B (SRB) assay. In brief, 4 × 104 MCF-7 cells were added to 6-well plates and incubated for 24 hours in complete media. Cells were treated with another aliquot of 100 µL media containing plant extract at 0-3000 ug/ml concentrations. After 72 h, cells were fixed with ice-cold 10% TCA at 4 °C for 1 h. The TCA solution was removed, and the cells were washed 5 times with distilled water. Aliquots of 70 µL SRB solution (0.4% w/v) were added and incubated in a dark place at room temperature for 10 min.

After three washes with 1% acetic acid, plates were air-dried overnight. After that, In order to dissolve the protein-bound SRB stain, 150 µL of TRIS (10 mM) was added. Using a BMG LABTECH® - FLUOstar Omega microplate reader, the absorbance was measured at 540 nm.

Statistical Analysis

Using one-way ANOVA, the results were reported as mean ± standard deviation (Mean ± SD). P- values < 0.05 indicate significant differences in the data.

Results and discussion

The cytotoxic effect of the methanol extract of *Aloe castellorum* on human breast adenocarcinoma (MCF-7) was carried out using the SRB assay.

The results indicate that the *Aloe castellorum* showed weak cytotoxic effects against MCF-7 cell lines, with an IC50 value of 341 µg/ml (Fig. 1). *In vitro*, plant extract produced limited reductions in cell viability and limited cytotoxicity.

These results are in line with other studies reporting weak cytotoxicity of other *Aloe* species. *Aloe niebuhriana* latex extract showed a weak cytotoxic effect against MCF-7, HepG2 and HCT-116 tumor cells (Moharram *et al.*, 2020). According to results from MTT assay, Fox *et al.* (2017) found that *Aloe vera*, *Aloe ferox*, and *Aloe marlothii* had weak cytotoxic effects on HaCaT cells. Furthermore, some

studies showed the *in vitro* activity of some extracts of *Aloe* on survival of human-cell lines was not significant. In 2014, the study of DuPlessis and Hamman included *Aloe vera*, *Aloe marlothii*, *Aloe speciosa* and *Aloe ferox*, which all have not recorded any activity on SH-SY5Y (human neuroblastoma), HepG2 (human hepatocellular carcinoma) and HeLa (human epithelial adenocarcinoma.

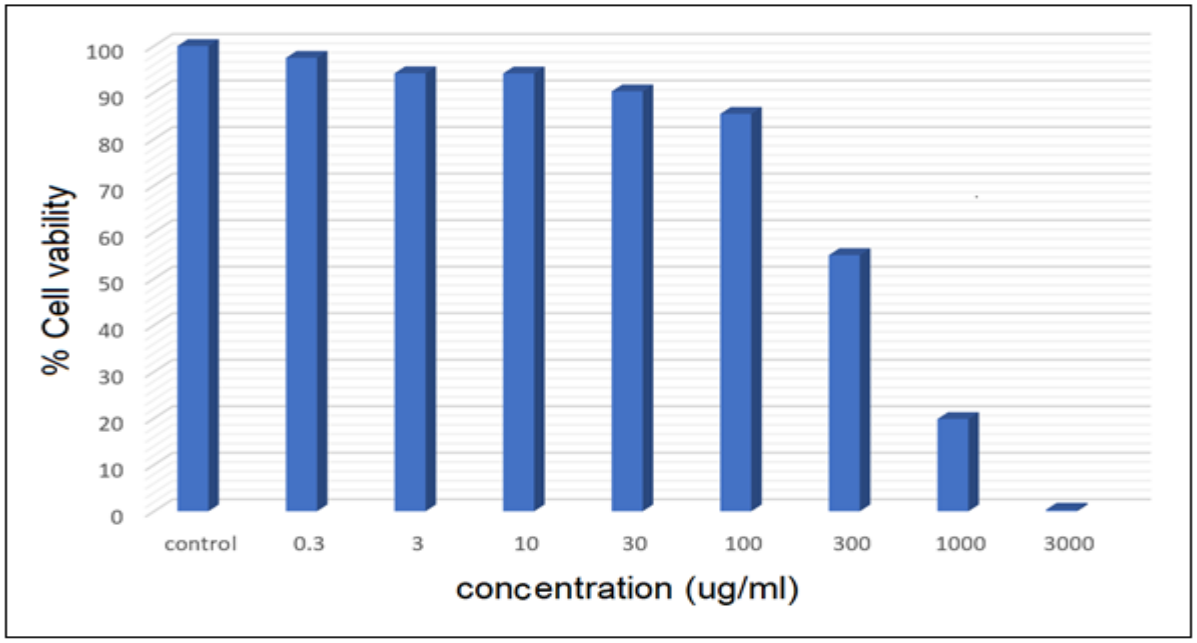

Fig. 1. Effect of Aloe *castellorum* on cell viability and growth of MCF-7 cells.

Conclusion

In this study, we tested the cytotoxic activity of *Aloe castellorum* against the MCF-7 cell line using the SRB assay. The results show that the methanolic extract of the plant leaves has a weak cytotoxic effect on the tested cancer cell line.

Conflict of interest

The author declares that there is no conflict of interest.

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