

Damnacanthal is a potent inducer of apoptosis with anticancer activity by stimulating p53 and p21 genes in MCF-7 breast cancer cells

ABSTRACT

Damnacanthal, an anthraquinone compound, is isolated from the roots of *Morinda citrifolia* L. (noni), which has been used for traditional therapy in several chronic diseases, including cancer. Although noni has long been consumed in Asian and Polynesian countries, the molecular mechanisms by which it exerts several benefits are starting to emerge. In the present study, the effect of damnacanthal on MCF-7 cell growth regulation was investigated. Treatment of MCF-7 cells with damnacanthal for 72 h indicated an antiproliferative activity. The MTT method confirmed that damnacanthal inhibited the growth of MCF-7 cells at the concentration of 8.2 $\mu\text{g/ml}$ for 72 h. In addition, the drug was found to induce cell cycle arrest at the G1 checkpoint in MCF-7 cells by cell cycle analysis. Damnacanthal induced apoptosis, determined by Annexin V-fluorescein isothiocyanate/propidium iodide (PI) dual-labeling, acridine-orange/PI dyeing and caspase-7 expression. Furthermore, damnacanthal-mediated apoptosis involves the sustained activation of p21, leading to the transcription of p53 and the Bax gene. Overall, the present study provided significant evidence demonstrating that p53-mediated damnacanthal induced apoptosis through the activation of p21 and caspase-7.

Keyword: Damnacanthal; MCF-7 cell growth; Apoptosis; Anticancer activity