TOXICITY AND GENE EXPRESSION ASSESSMENTS IN VERNONIA AMYGDALINA-TREATED BREAST CANCER CELLS

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Abstract: Cancer of the breast is the most commonly diagnosed non-skin cancer and second leading cause of cancer-related deaths in women in the United States. Breast cancer represents 29% of new cases of all cancers. An estimated 226,870 women will be diagnosed with invasive breast cancer and 39,510 women will die from the disease this year in the United States. There is an urgent need for the discovery and development of agent(s) efficacious against breast cancer to decrease breast cancer mortality and morbidity. National surveys on the use of Complementary and Alternative Medicine (CAM) among patients show more than eighty percent of cancer patients, representing a spectrum of malignancies and disease stages acknowledged the use of CAM. The growing popularity of CAM usage has led to the discovery of aqueous leaf extracts of Vernonia amygdalina (V. amygdalina), a Nigerian edible plant as a very strong candidate. Previous studies have shown V. amygdalina to inhibit the proliferation of estrogen receptor positive (ER+) and estrogen receptor negative (ER-) human breast carcinoma cells in vitro. V. amygdalina may be used alone or in combination (adjuvant) with known breast cancer drugs. Therefore, the central goal of this research was to determine the therapeutic mechanisms of V. amygdalina leaf extracts in breast cancer cells. To achieve this goal, cell viability, live and death cells were determined by the means of the MTT and propidium iodine assays, respectively. Western blot analysis was performed to assess the expression of p53 tumor suppressor. Data obtained from the MTT assay indicated that V. amygdalina significantly reduced the viability of MCF-7 cells in a dose-dependent response. On one hand, the Trypan blue dye exclusion test demonstrated the integrity of the membrane of untreated cells in culture. On the other hand, the trypan blue dye exclusion test demonstrated a loss of viability in V. amygdalina-treated cells due to membrane damage. A statistically significant was recorded with propidium iodine data, showing an increase of necrotic cell death in V. amygdalina-treated cells, indicative of membrane rupture by V. amygdalina. No statistically significant differences (p>0.05) in p53 expression was found between V. amygdalina-treated cells and the control, suggesting that there was that was not arrested at G1/G0 upon 24 hours of treatment. Taken together, our research demonstrated that V. amygdalina treatment induced cytotoxic effects and expression of p53 tumor suppressor gene in cancer cells.

Keywords: Vernonia amygdalina, MCF-7 cells, breast cancer, p53, cellometer vision.

Acknowledgements: This research was financially supported by a grant from the National Institutes of Health (Grant No. G12RR013459-14), through the RCMI-Center for Environmental Health