

CYTOGENOTOXIC EFFECTS OF *VERNONIA AMYGDALINA* AND PACLITAXEL ON ESTROGEN RECEPTOR NEGATIVE BREAST CANCER CELLS

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Abstract: Using natural products as chemotherapeutic agents against Breast Cancer has gained international attention because the disease continues to hail as the leading cause of death in women between ages 40-55 and also, use of currently available treatment drugs such as Paclitaxel (TAX) causes numerous adverse side effects. It has been shown *Vernonia amygdalina* (VA), a plant grown in Nigeria, has chemotherapeutic properties with no known, accompanying side effects. Experiments assessing cell viability and DNA damage following treatment with VA and/or TAX were conducted in estrogen receptor negative MDA MB 231 breast cancerous cells. Our goal was to provide evidence to support VA's usage as an alternative to TAX treatment, thus eliminating the unwanted side effects associated with TAX usage, while effectively inhibiting cancerous growth. Cells were propagated in RPMI-1640 medium, supplemented with 10% fetal bovine serum and 1% penicillin-streptomycin. Inhibition of proliferation was assessed by [³H] thymidine incorporation assays and confirmed by cell counts using a hemacytometer. When given alone, VA was shown to exhibit anti-proliferative and genotoxic effects in cancer cells. Additionally, when given in combination with TAX, a synergistic or additive effect toward MDA MB 231 cell growth inhibition was observed. TAX (100 nM) and VA (500 µg/ml) inhibited DNA synthesis, on average of three independent experiments by 50 and 364% respectively. Interestingly, TAX alone had no effects on DNA synthesis, but inhibited DNA synthesis significantly ($P < 0.5$) in the presence of VA in a VA concentration-dependent fashion. Using the comet assay, the VA and/or TAX-induced genotoxic effects were revealed by the significant increase in DNA damage, comet tail-lengths, and tail moment, when compared to non-exposed cells (% DNA damage: Control 0.31; VA only 63.45; TAX only 41.54; VA + TAX 70.18). These studies revealed that VA treatment alone affected DNA synthesis and exhibited genotoxic effects; and VA synergized with TAX, enhancing the cytogenetic effects. These findings may translate to patient regimens with reduced dosage amounts of this commonly used chemotherapeutic agent TAX, thus, fewer side effects, improve quality of life and better survival rates.

Key Words: *Vernonia amygdalina*, Paclitaxel, MDA MB 231 cells, [³H] thymidine incorporation assay, comet assay

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