Cytotoxic and Genotoxic Potentials of the Money Tree (Pachira aquatica) Stem and Leaf Extracts

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The discovery and development of chemotherapeutic drugs is a continuous worldwide demand. This study was designed as an anticancer prescreening to evaluate the cytotoxic and genotoxic potentials of leaf and stem extracts of Money tree (Pachira aquatica), one of the unexplored plant species. Bioactivity of MT extracts was initially assessed using brine shrimp lethality assay (BSLA). Plant and animal models of cell proliferation were used to investigate cytostatic and cytocidal effects. Onion root tip chromosomal aberration assay (ORTCAA) was conducted to examine antimitotic and genotoxic activities. Embryotoxicity and teratogenicity were determined in zebrafish developmental toxicity assay (ZDTA). Using BSLA, MT stem and leaf extracts had estimated LC50 values of 104.75 and 121.69 µg/ml respectively which indicated that both extracts were bioactive/toxic. ORTCAA revealed that all stem extract concentration reduced mitotic indices which were comparable to Maleic hydrazide (positive control) while all leaf extract concentrations induced mitotic block at prophase/metaphase boundary. Prominent chromosomal aberrations observed were bridges and stickiness suggesting genotoxicity of extracts. ZDTA showed 100% embryonic death at 20, 100 and 200 µg/ml of both extracts after 12-hour post-treatment application. Moreover, cytological abnormalities in onion cells and early zebrafish embryonic death implied the activation of apoptosis. Though the results cannot be confirmed generally whether the extracts could genotoxic or cytotoxic or both, the extracts have promising cytostatic (inhibition of growth, division and differentiation) and cytocidal (lethal) effects, important fates of an anticancer drug and is therefore a potential source of a nature-based chemotherapeutic compound.

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