An *In Vitro* Anticancer Activity Evaluation of *Neolamarckia cadamba* (Roxb.) Bosser Leaves' Extract and its Metabolite Profile

ABSTRACT

The leaves of Neolamarckia cadamba (NC) (Roxb.) Bosser (family: Rubiaceae) are traditionally used to treat breast cancer in Malaysia; however, this traditional claim is yet to be scientifically verified. Hence, this study was aimed to evaluate the anticancer effect of NC leaves' ethanol extract against breast cancer cell line (MCF-7 cells) using an in vitro cell viability, cytotoxicity, and gene expression assays followed by the gas chromatography analysis to further confirm active principles. Results revealed 0.2 mg/ml as the half maximal inhibitory concentration (IC50) against MCF-7. The extract exerted anticancer effect against MCF-7 cells in a dose- and time-dependent manner. The cell cycle assay showed that the extract arrested MCF-7 cells in the G0/G1 phase, and apoptosis was observed after 72 h by the Annexin-V assay. The gene expression assay revealed that the cell cycle arrest was associated with the downregulation of CDK2 and subsequent upregulation of p21 and cyclin E. The extract induced apoptosis via the mediation of the mitochondrial cell death pathways. A chromatography analysis revealed the contribution of D-pinitol and myo-inositol as the two major bioactive compounds to the activity observed. Overall, the study demonstrated that NC leaves' ethanol extract exerts anticancer effect against MCF-7 human breast cancer cells through the induction of apoptosis and cell cycle arrest, thereby justifying its traditional use for the treatment of breast cancer in Malaysia.