

Anticancer activity of *Momordica cochinchinensis* (red gac) aril and the impact of varietal diversity

ABSTRACT

Background: *Momordica cochinchinensis* (Cucurbitaceae) is a nutritionally and medicinally important fruit restricted to South East Asia with diverse morphological and genetic variations but there is limited information on its medicinal potential.

Methods: *M. cochinchinensis* aril from 44 different samples in Australia, Thailand and Vietnam were extracted using different solvents and tested for its anticancer potential. Anticancer activity of *M. cochinchinensis* aril on breast cancer (MCF7 and BT474) and melanoma (MM418C1 and D24) cells were compared to control fibroblasts (NHDF). The cytotoxicity of the cells following treatment with the aril extract was determined using CCK-8 assay. Biochemical and morphological changes were analysed using flow cytometry, confocal and transmission electron microscopy to determine the mechanism of cell death.

Results: The water extract from the aril of *M. cochinchinensis* elicited significantly higher cytotoxicity towards breast cancer and melanoma cells than the HAE extract. The IC50 concentration for the crude water extract ranged from 0.49 to 0.73 mg/mL and induced both apoptotic and necrotic cell death in a dose- and time-dependant manner with typical biochemical and morphological characteristics. The greatest cytotoxicity was observed from Northern Vietnam samples which caused 70 and 50% melanoma and breast cancer cell death, respectively.

Conclusions: The water extract of *M. cochinchinensis* aril caused significant apoptosis and necrosis of breast cancer and melanoma cells, with varieties from Northern Vietnam possessing superior activity. This highlights the potential of this fruit in the development of novel anticancer agents against such tumours, with specific regions on where to collect the best variety and extraction solvent for optimum activity.