

UNIVERSITI TEKNOLOGI MARA

**THE POTENTIAL ANTICANCER
EFFECTS OF *Goniothalamus
lanceolatus* EXTRACTS IN INDUCING
APOPTOSIS IN BREAST CANCER
(MCF-7) AND OVARIAN CANCER
(PEO1 AND PEO4) CELL LINES**

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.


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ABSTRACT

Goniothalamus lanceolatus (GL) also known locally as “Getimang” is an indigenous plant in Sarawak commonly used as herbal extract to treat fever, skin infections and food poisoning. Previous studies showed the genus possessed anticancer properties towards several cancer cell lines. In Malaysia, breast and ovarian cancers are common cancers in women. The failure of patients to respond towards chemotherapy drugs with severe side effects has been a major problem in the recent years. The objective of the present research was to determine the potential anticancer effect of GL extracts on antiproliferative and apoptosis activities in breast cancer (MCF-7) and ovarian cancer (PEO1 and PEO4) cell lines. GL extracts from bark, leaves and roots were dissolved in dichloromethane (DCM), hexane and methanol. The cytotoxicity of GL extracts against MCF-7, PEO1 and PEO4 cancer cell lines after 24 h was assessed by MTT assay. GL-treated cell migration rates for 0 h, 16 h, 24 h, 48 h and 72 h were performed by scratch assay. Apoptosis activity was assessed using Annexin V/PI staining assay analysis through flow cytometry. Bax/Bcl-2 apoptotic protein expression was analyzed by western blot. MTT assay revealed that GL can significantly reduce the viability of these cells at the lowest IC₅₀ concentration of bark in DCM (GLBD) extract for MCF-7 cell line ($23.89 \pm 0.16 \mu\text{g/ml}$), root in methanol (GLRM) extract for PEO1 cell line ($31.40 \pm 0.77 \mu\text{g/ml}$) and leaves in DCM (GLLD) extract for PEO4 cell line ($22.02 \pm 0.52 \mu\text{g/ml}$) in a concentration-dependent manner. These extracts were then selected for further study. Selected GL extracts at IC₂₀, IC₅₀ and IC₈₀ concentration suppressed the ability of the breast and ovarian cancer cell lines to migrate upon 72 h of treatment compared to untreated cells. Flow cytometric analysis showed GL induced cancer cell lines to undergo early and late apoptosis as the concentration increased. In addition, apoptotic processes were intensified with the increase of treatment duration to 48 h. GL-induced apoptosis was followed by the upregulation of Bax protein and downregulation of Bcl-2 protein in the MCF-7 breast cancer cell line. However, Bax and Bcl-2 were not expressed in both ovarian cancer cell lines. The data suggested the regulation of Bax/Bcl-2 was not crucial in PEO1 and PEO4 cell lines. Overall, the findings showed the promising activities of GL extracts in inhibiting cell viability, cell migration together with apoptotic cell death induction in breast cancer and ovarian cancer cell lines. Therefore, the data proposed that GL has the potential to be developed as an alternative chemotherapeutic agent in breast and ovarian cancer. However, further *in-vivo* and clinical studies are still needed to clarify the mechanism involved.

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