

Modification of The Structure of Chalcone Derivatives Isolated from Fingerroot rhizome (*Boesenbergia rotunda*) As A Potential Anticancer Agents for Breast Cancer

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Abstract

Women worldwide, including in Indonesia, are particularly vulnerable to breast cancer, which is often detected at advanced stages. Existing treatment approaches have weaknesses and low success rates, as the drugs used become less effective and cancer cells can develop resistance. Therefore, we need to innovate to create new anticancer drug candidates from natural sources like the fingerroot rhizome (*Boesenbergia rotunda*). In this study, in silico testing was conducted to predict cytotoxic activity using AutoDock Vina. The isolation of the rhizome and the synthesis of chalcone derivatives were performed using green synthesis methods through Williamson ether reactions with microwave irradiation. Structure identification was carried out using an IR spectrometer and a ¹H-NMR spectrometer. In vitro activity was assessed using MTT assays on MCF-7 cells and normal Vero cells. The results showed that the chalcone compounds, Bis-4-chlorobenzyloxychalcone and Bis-4-bromobenzyloxychalcone, exhibited better bioavailability, toxicity, and activity in silico. In vitro, they demonstrated significant cytotoxic activity compared to tamoxifen against MCF-7 cells and greater selectivity towards MCF-7 cells compared to normal Vero cells. Therefore, Bis-4-chlorobenzyloxychalcone and Bis-4-bromobenzyloxychalcone have the potential to be candidates for anticancer drugs for breast cancer, providing alternative options to reduce the side effects associated with drug use.

Keywords

Breast Cancer ; Chalcone ; Fingerroot rhizomes (*Boesenbergia rotunda*) ; Green Chemistry ; MCF-7



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