

ABSTRACT

Aissya Safriliana Isnaeni. 24020222130026. ***Anticancer Potential and Metabolite Screening of Caulerpa sp. Fermentation Extracts against T47D Breast Cancer Cell Lines in Vitro and In Silico.*** Under the supervision of Dr. Sri Pujiyanto, S.Si, M.Si. and Puspa Hening, S.Pd, M.Biotech.

Breast cancer is the most prevalent type of cancer among women worldwide, including in Indonesia. Limitations in both conventional and modern therapies have driven the exploration of alternative anticancer agents from natural sources. *Caulerpa* sp. is a green marine macroalga known to contain a variety of bioactive metabolites. Fermentation using *Lactobacillus plantarum* has the potential to enhance the alga's bioactivity profile through enzymatic biotransformation. This study aims to explore the anticancer potential of *Caulerpa* sp. fermentation extract by evaluating antioxidant activity using the DPPH method and cytotoxicity against T47D breast cancer cells in vitro, identifying the metabolite profile via LC-HRMS, and predicting the interaction of bioactive compounds with the estrogen receptor alpha (ER- α) through molecular docking. The DPPH antioxidant activity assay showed that the 24-hour fermented extract produced a significantly better IC₅₀ value compared to the 48-hour extract, namely 49,6 ppm. A cytotoxicity assay against T47D cells using the MTT assay yielded an IC₅₀ of 6944 ppm. Screening via LC-HRMS identified 227 metabolites, predominantly amino acids and peptides, organic acids, and small amounts of polyphenols, alkaloids, and terpenoids. Molecular docking against ER- α (PDB ID: 3ERT) indicated 6-oxocativic acid as the most promising compound with a binding affinity of -9,78 kcal/mol and a Ki of 0,068 μ M, surpassing doxorubicin (-8,61 kcal/mol), a commercially available breast cancer drug.

Keywords: *Anticancer, Caulerpa sp., non-targeted screening, T47D cells, molecular docking.*