

ABSTRACT

Febry Anadya Ekaputri. 24020120140169. Molecular Characterization, Alpha Amylase Enzyme Inhibition Assay, and Molecular Docking of Starfruit Plant and Insulint Plant as Antihyperglycemic Agents. Under the guidance of Hermin Pancasakti Kusumaningrum and Budi Raharjo.

Starfruit plant and insulint plant are phytopharmaca plants that contain secondary metabolites that are used as herbal medicines. One of their potential function is for antihyperglycemic agents. Hyperglycemia is a condition in which blood sugar levels exceed normal levels, leading to the onset of diabetes mellitus. The enzyme that plays a role in absorbing carbohydrates in the body is the α -amylase enzyme. When blood sugar levels high, glucose absorption must be delayed by inhibiting the production of the α -amylase enzyme. Insulin plant and Starfruit plant are considered potential as α -amylase enzyme inhibitors. The study was conducted to determine the molecular characterization of Starfruit plant and insulin plant using ITS markers and evaluate the inhibitory activity of sample against the α -amylase enzyme using in vitro assay and molecular docking. The research was carried out by DNA isolation using the Doyle Doyle method, quantitative analysis of DNA using nanodrop, amplification of the ITS region, sequence analysis, in vitro assay using spectrophotometric UV VIS, and Molecular docking between the Structure of Human Pancreatic Alpha Amylase in Complex With The Carbohydrate Inhibitor Acarbose (PDB ID: 1B2Y) and the test ligands identified by GC-MS analysis. Molecular characterization showed that belimbing wuluh had the highest similarity to the sequence of *Averrhoa bilimbi* (accession number: MZ014946.1), and insulin plant to *Gymnanthemum amygdalinum* (accession number: OQ355490.1). The in vitro assay results were expressed as IC90 values and percent inhibition values for each sample extract at different concentrations against the α -amylase enzyme. The highest percent inhibition values were observed for wuluh leaf extract (98%), wuluh fruit extract (97%), and insulin leaf extract (97%). The IC90 values of wuluh fruit extract and insulin leaf extract were 13.82 ppm and 9.88 ppm. Docking results between the receptor protein and the native ligand showed a binding energy of -9.7 kcal/mol. Docking with test ligands, namely *3-O-(trimethylsilyl)-5,7,40-trimethylkaempferol* from starfruit and *Luteolin* from insulin plant, resulted in binding energies of -8.8 kcal/mol and -9.0 kcal/mol, respectively. These values are higher than the binding energy of the native ligand, indicating potential binding capability despite having negative binding energies.

Keywords: Starfruit plant, Binding affinity, Insulin plant, *In Vitro* assay, GC-MS