ABSTRAK

Enzim Dipeptidil Peptidase IV (DPP-IV) adalah suatu serin aminopeptidase yang mempercepat degradasi pada hormon inkretin dan homeostasis glukosa. Penghambatan enzim DPP-IV dapat diperoleh dari bahan alam yang mengandung senyawa fenolik salah satunya yaitu resveratrol. Telah dilaporkan bahwa resveratrol memiliki efek penghambatan terhadap DPP-IV dilihat dari nilai IC_{50}. Penelitian ini bertujuan untuk mengetahui stabilitas kompleks Dipeptidil Peptidase IV (DPP-IV) dan resveratrol dalam simulasi dinamika molekul sehingga menjadi referensi dalam mengembangkan obat diabetes melitus tipe 2. Pengujian interaksi resveratrol dengan DPP-IV dilakukan menggunakan metode kimia komputasi (*in silico*) melalui simulasi dinamika molekul menggunakan YASARA-*Structure*. Jenis penelitian ini termasuk penelitian teoretis deskriptif eksploratif yang menggunakan parameter RMSD (*Root Mean Square Deviation*) dikatakan valid apabila nilai RMSD ≤2 Å, nilai RMSF (*Root Mean Square Fluctuation*) >0,05 nm (0,5 Å), dan MM/PBSA (*Molecular Mechanics Poisson-Boltzmann Surface Area*) < 1 kJ/mol. Hasil dari penelitian ini menunjukan bahwa resveratrol membentuk kompleks yang tidak stabil dengan nilai ΔRMSD atom-atom *backbone* dan *Ligand Move* berturut-turut sebesar 0,196 dan 3,810 Å, Nilai RMSF berturut-turut resveratrol dengan asam amino sisi aktif katalitik enzim sebesar 0,62 Å untuk Ser:630, 1,19 Å untuk Asp:710, dan 0,77 Å untuk His:740. Namun resveratrol masih termasuk kategori inhibitor kompetitif.

Kata kunci: Diabetes melitus tipe 2, Dipeptidil Peptidase IV (DPP-IV), Resveratrol, *Molecular Docking,* Dinamika Molekul

ABSTRACT

Enzyme Dipeptidyl Peptidase IV (DPP-IV) is a serine aminopeptidase that accelerates the degradation of incretin hormones and glucose homeostasis. Inhibition of DPP-IV enzymes can be obtained from natural materials containing phenolic compounds, one of which is resveratrol. It has been reported that resveratrol has an inhibitory effect on DPP-IV as measured by the IC_{50} value. This study aims to determine the stability of the Dipeptidyl Peptidase IV (DPP-IV) complex and resveratrol in molecular dynamics simulations so that it becomes a reference in developing diabetes mellitus type 2 drugs. The interaction test of resveratrol with DPP-IV were carried out using computational chemical methods (in silico) through molecular dynamics simulation using YASARA-Structure. This type of research includes explorative descriptive theoretical research using RMSD (Root Mean Square Deviation) parameters which are said to be valid if the RMSD value is ≤ 2 Å, the RMSF (Root Mean Square Fluctuation) value is > 0.05 nm (0.5 Å), and MM/ PBSA (Molecular Mechanics Poisson-Boltzmann Surface Area) < 1 kj/mol. The results of this study indicate that resveratrol forms unstable complexes with ΔRMSD values of the backbone atoms and Ligand Move of 0.196 and 3.810 Å respectively, RMSF values of resveratrol with amino acids of the catalytically active site of the enzyme are 0.62 Å for Ser:630, 1.19 Å for Asp:710, and 0.77 Å for His:740. However, resveratrol is still included in the category of competitive inhibitors.

Keywords: *Diabetes mellitus type 2, Dipeptidyl Peptidase IV (DPP-IV), Resveratrol, Molecular Docking, Molecular Dynamics*