

ABSTRAK

Diabetes melitus merupakan gangguan metabolisme tubuh yang ditandai dengan kondisi hiperglikemia akibat resistensi insulin dan/atau sekresi insulin yang bermasalah. Penghambatan terhadap enzim DPP-IV dapat menjadi target pengobatan diabetes melitus tipe 2 karena dapat meningkatkan sekresi insulin dan menghambat sekresi glukagon. Dipeptidil Peptidase-IV (DPP-IV) merupakan protein multi fungsi yang berguna sebagai katalis, protein pengikat, dan ligan untuk berbagai molekul ekstraseluler. Enzim DPP-IV memiliki potensi untuk mempengaruhi kontrol glikemik dan mempengaruhi sensitivitas insulin. Senyawa alam fenolik flavonoid termasuk naringenin dilaporkan memiliki aktivitas penghambatan DPP-IV dengan nilai $IC_{50} 0.24 \pm 0.03 \mu M$. Penelitian ini bertujuan untuk mengetahui kemampuan naringenin dalam menstabilkan struktur enzim DPP-IV. Jenis penelitian ini termasuk dalam penelitian teoretis deskriptif eksploratif dengan parameter utama nilai *Root Mean Square Deviation* (RMSD) atom-atom *backbone* DPP-IV $\leq 2 \text{ \AA}$ yang didapatkan dari simulasi dinamika molekul. Simulasi dinamika molekul untuk memprediksi pergerakan setiap atom dalam sistem molekuler seiring berjalannya waktu dilakukan melalui server utama. Hasil penelitian menunjukkan bahwa naringenin memiliki kemampuan penghambatan aktivitas Dipeptidil Peptidase IV (DPP-IV) dengan mempertahankan stabilitas struktur enzim dengan nilai RMSD atom-atom *backbone* DPP-IV 1.024 \AA .

Kata kunci: Dipeptidil Peptidase-IV (DPP-IV), naringenin, dinamika molekul, *Root Mean Square Deviation* (RMSD)

ABSTRACT

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia and can be caused by insulin resistance and/or insulin secretion problem. Inhibition of the DPP-IV enzyme can be a target for type 2 diabetes mellitus treatment because it can increase the secretion of insulin and inhibit glucagon secretion. Dipeptidyl Peptidase-IV (DPP-IV) is a multi-functional protein that is useful as a catalyst, binding protein, and ligand for various extracellular molecules. The DPP-IV enzyme has the potential to affect glycemic control and insulin sensitivity. Natural phenolic flavonoid compounds including naringenin were reported to have inhibitory activity of DPP-IV with IC_{50} value of $0.24 \pm 0.03 \mu M$. This study aims to determine the ability of naringenin in stabilizing the structure of the DPP-IV enzyme. This research is an exploratory descriptive theoretical research with the main parameter values is Root Mean Square Deviation (RMSD) DPP-IV backbone atoms $\leq 2 \text{ \AA}$ obtained from molecular dynamics simulations. Molecular dynamics simulations are applicable to predict the movement of each atoms in the molecular system over time and are carried out via the main server. The results showed that naringenin had the ability to inhibit the activity of Dipeptidyl Peptidase IV (DPP-IV) by maintaining the stability of the enzyme structure with the RMSD value of the backbone atoms of DPP-IV 1.024 \AA .

Keywords: Dipeptidyl Peptidase-IV (DPP-IV), naringenin, molecular dynamics, Root Mean Square Deviation (RMSD)