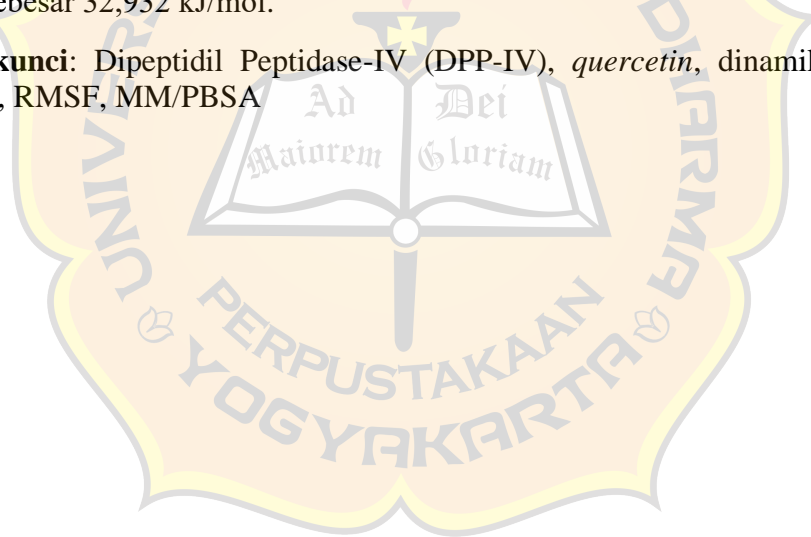


## ABSTRAK

Diabetes melitus tipe 2 disebabkan oleh hilangnya sekresi insulin sel beta yang adekuat secara progresif sering dengan latar belakang resistensi insulin. Salah satu obat oral untuk pengobatan diabetes melitus tipe 2 yaitu inhibitor Dipeptidil Peptidase-IV (DPP-IV). Senyawa alam yang dapat dimanfaatkan sebagai obat diabetes yaitu senyawa flavonoid, salah satunya *quercetin*. Mekanisme *quercetin* sebagai inhibitor DPP-IV dapat diamati melalui simulasi dinamika molekul. Penelitian ini bertujuan untuk mengetahui stabilitas kompleks Dipeptidil Peptidase IV (DPP-IV) dan *quercetin* dalam simulasi dinamika molekul 50 ns. Jenis penelitian ini merupakan penelitian teoretis deskriptif eksploratif dengan parameter nilai *Root Mean Square Deviation* (RMSD)  $\leq 2 \text{ \AA}$ , *Root Mean Square Fluctuation* (RMSF)  $< 0,5 \text{ \AA}$ , dan *Molecular Mechanics/Poisson-Boltzmann Surface Area* (MM/PBSA)  $< 0 \text{ kJ/mol}$ . Hasil penelitian ini menunjukkan bahwa terbentuk kompleks Dipeptidil Peptidase IV (DPP-IV) dan *quercetin* yang stabil dengan nilai  $\Delta$ RMSD atom-atom *backbone* dan *ligand move* berturut-turut sebesar  $0,478 \text{ \AA}$  dan  $1,487 \text{ \AA}$  pada 5 ns terakhir dalam *production run*. Kemudian nilai RMSF yang diperoleh pada sisi katalitik yaitu residu Ser630, Asn710 dan His740 berturut-turut sebesar  $0,86 \text{ \AA}$ ,  $1,09 \text{ \AA}$ , dan  $0,62 \text{ \AA}$ , serta nilai MM/PBSA atau nilai rata-rata *binding free energy* ( $\Delta G$ ) sebesar  $32,932 \text{ kJ/mol}$ .

**Kata kunci:** Dipeptidil Peptidase-IV (DPP-IV), *quercetin*, dinamika molekul, RMSD, RMSF, MM/PBSA



## ABSTRACT

Type 2 diabetes mellitus is caused by a progressive loss of adequate beta-cell insulin secretion, often against a background of insulin resistance. One of the oral drugs for the treatment of type 2 diabetes mellitus is the Dipeptidyl Peptidase-IV (DPP-IV) inhibitor. Natural compounds that can be used as diabetes drugs are flavonoid compounds, one of which is quercetin. The mechanism of quercetin as a DPP-IV inhibitor can be observed through molecular dynamics simulations. This research aims to determine the stability of the Dipeptidyl Peptidase IV (DPP-IV) complex and quercetin in 50 ns molecular dynamics simulation. This is a descriptive explorative theoretical research with parameter values of Root Mean Square Deviation (RMSD)  $\leq 2$  Å, Root Mean Square Fluctuation (RMSF)  $< 0.5$  Å, and Molecular Mechanic/Poisson-Boltzmann Surface Area (MM/PBSA)  $< 0$  kJ/mol. The results of this research indicate that a stable Dipeptidyl Peptidase IV (DPP-IV) and quercetin complex was formed with  $\Delta$ RMSD values of the backbone atoms and ligand move of 0.478 Å and 1.487 Å in the last 5 ns of the production run, respectively. Furthermore, the RMSF values obtained on the catalytic side, namely Ser630, Asn710 and His740 residues were 0.86 Å, 1.09 Å and 0.62 Å respectively, as well as the MM/PBSA value or the average value of binding free energy ( $\Delta$ G) of 32.932 kJ/mol.

**Keywords:** Dipeptidyl Peptidase-IV (DPP-IV), quercetin, molecular dynamics, RMSD, RMSF, MM/PBSA

