ABSTRAK

Diabetes Melitus tipe 2 (DMT2) disebabkan oleh defisiensi sekresi insulin atau resistensi insulin. Salah satu terapi farmakologi DMT2 adalah inhibitor Dipeptidil Peptidase IV (DPP-IV) yang cukup efektif untuk mengendalikan kadar glukosa darah dan efek sampingnya relatif lebih aman dibanding antidiabetes oral lain. Meskipun demikian, inhibitor DPP-IV cukup mahal sehingga perlu dilakukan eksplorasi alternatif bahan alam dengan aktivitas inhibitor DPP-IV. Penelitian ini bertujuan untuk mengetahui aktivitas *quercetin* sebagai penstabil struktur enzim DPP-IV. *Quercetin* sebagai ligan merupakan senyawa bahan alam yang dilaporkan memiliki aktivitas penghambatan pada DPP-IV. Jenis penelitian ini yaitu teoretis deskriptif eksploratif dengan parameter utama nilai *Root Mean Square Deviation* (RMSD) atom-atom *backbone* DPP-IV ≤ 2 Å. Ligan akan diikatkan pada DPP-IV dengan kantung ikatan yang didefinisikan oleh ligan ko-kristal. Selanjutnya dilakukan simulasi dinamika molekul sesuai perintah pada berkas makro (md_run.mcr) yang sudah diatur sedemikian rupa dengan durasi 15 ns. Data kemudian dianalisis dengan berkas makro (md_analysis.mcr). Luaran yang didapatkan berupa nilai RMSD atom-atom *backbone* DPP-IV dan dilihat ΔRMSD pada 5 ns terakhir. Hasil penelitian menunjukkan nilai ΔRMSD *quercetin* 1,103 Å dan mampu menghambat aktivitas DPP-IV dengan menstabilkan struktur enzim.

Kata kunci: Diabetes melitus tipe 2 (DMT2), Dinamika molekul, Inhibitor DPP-IV, *Quercetin*, *Root Mean Square Deviation* (RMSD)

ABSTRACT

Type 2 diabetes mellitus (T2DM) caused by insulin secretion deficiency or insulin resistance. One of T2DM pharmacological therapies is Dipeptidyl Peptidase IV (DPP-IV) inhibitor which is effective for controlling blood glucose levels and its side effects are safer than other oral antidiabetics. However, DPP-IV inhibitors are quite expensive, so it is necessary to explore alternative natural materials with DPP-IV inhibitor activity. This study aims to figure activity of quercetin as structural stabilizer of the DPP-IV enzyme. Quercetin as a ligand is natural compound that's reported to have inhibitory activity on DPP-IV. The type of this research is descriptive exploratory theory with Root Mean Square Deviation (RMSD) DPP-IV backbone atoms ≤ 2 Å as the main parameter. Ligand will bind to the DPP-IV by the binding pocket defined by the co-crystal ligand. Furthermore, molecular dynamics simulations carried out according to the command in the macro file (md_run.mcr) that has been set in such a way with 15 ns duration. The data analyzed with a macro file (md_analysis.mcr). The output obtained is the RMSD value of the DPP-IV backbone atoms and the ΔRMSD is seen in the last 5 ns. The results showed that the ΔRMSD value of quercetin was 1.103 Å and able to inhibit DPP-IV activity by stabilizing the enzyme structure.

Keywords: Type 2 Diabetes Mellitus (T2DM), Molecular dynamics, DPP-IV inhibitors, Quercetin, Root Mean Square Deviation (RMSD)