ABSTRAK

STUDI POTENSI BEBERAPA SENYAWA AKTIF ANTIKANKER SEBAGAI INHIBITOR ENZIM IGF-1R

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Latar Belakang: Ekspresi berlebihan enzim Insulin-like Growth Factor 1 Receptor (IGF-1R) dapat menyebabkan perkembangan kanker. Beberapa senyawa bahan alam yang berpotensi sebagai antikanker dan belum diteliti sebagai inhibitor IGF-1R, antara lain alfa mangostin, alashanoid B, andrografolid, etil-p metoksisinamat (EPMC), galangin, gamma mangostin, kurkumin, pinostrobin, pinocembrin, sinamaldehid, dan xantorizol. Penelitian ini bertujuan untuk mengetahui senyawa yang paling berpotensi sebagai inhibitor IGF-1R berdasarkan hasil penambatan molekuler dan dinamika molekuler.

Metodologi: Penambatan molekuler dilakukan dengan menghitung energi ikatan menggunakan AutoDock Vina, Perhitungan RMSD menggunakan PyMOL, dan visualisasi hasil penambatan pada BIOVIA Discovery Studio. Selanjutnya senyawa hasil penambatan terbaik dilakukan simulasi dinamika molekuler pada program YASARA.

Hasil Penelitian: Hasil penambatan molekuler 11 senyawa uji menunjukkan bahwa gamma mangostin memiliki energi ikatan terendah sebesar -8,3 kkal/mol, sementara kontrol linsitinib sebesar -9,1 kkal/mol. Pada visualisasi penambatan molekuler gamma mangostin mengikat situs pengikatan ATP yaitu Lys1033. Secara dinamika molekuler, gamma mangostin memiliki nilai rata-rata RMSD (1,605 Å), rata-rata RMSF (1,196 Å), nilai RMSF residu Tyr1251 (0,826 Å), Met1079 (1,13 Å), Met1082 (0,811 Å), Glu1080 (0,873) dan Lys1033(1,095 Å). Nilai binding energy sebesar -42.167,71 kJ/mol dan ikatan hidrogen terbentuk pada Met1082 yang merupakan situs pengikatan ATP.

Kesimpulan: Senyawa gamma mangostin berpotensi sebagai inhibitor IGF-1R

Kata Kunci: dinamika molekuler, gamma mangostin, IGF-1R, penambatan molekuler

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ABSTRACT

STUDY OF THE POTENTIAL OF SOME ANTI-CANCER COMPOUNDS AS IGF-1R ENZYME INHIBITOR

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Background: Overexpression of the enzyme *insulin-like growth factor 1 receptor* (IGF-1R) can lead to the development of cancer. Several natural compounds that have the potential as anticancer and have not been studied as IGF-1R inhibitors, include alpha mangosteen, alashanoid B, andrographolide, ethyl-p methoxycinnamate (EPMC), galangin, gamma mangosteen, curcumin, pinostrobin, pinocembrin, cinnamaldehyde, and xanthorrizol. This study aims to determine the compounds with the most potential as an IGF-1R inhibitor based on the results of molecular docking and molecular dynamics

Methodology: Molecular docking is performed by calculating bond energy using AutoDock Vina, RMSD calculations using PyMOL, and visualization of molecular docking results in BIOVIA Discovery Studio. Furthermore, the compounds from the best docking were carried out by molecular dynamics simulations in the YASARA program.

Results: The results of the molecular docking of 11 test compounds showed that gamma mangosteen had the lowest bond energy of -8.3 kcal/mol, while control of linsitinib was -9.1 kcal/mol. In the visualization of molecular docking, gamma mangosteen binds to the ATP binding site, namely Lys1033. In molecular dynamic, gamma mangosteen has an average RMSD value (1,605 Å), average RMSF (1,196 Å), RMSF value of Tyr1251 residue (0,826 Å), Met1079 (1,13 Å), Met1082 (0,811 Å), Glu1080 (0,873 Å) and Lys1033 (1.095 Å). The binding energy value is -42.167.71 kJ/mol and hydrogen bonds are formed in Met1082 which is the binding site for ATP.

Conclusion: Gamma mangosteen compounds have potential as IGF-1R. inhibitors

Keywords: gamma mangosteen, IGF-1R, molecular docking, molecular dynamics

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