

INTISARI

ASTUTI, S., 2022, KAJIAN HUBUNGAN KUANTITATIF STRUKTUR DAN AKTIVITAS (HKSA) SENYAWA KURKUMIN DAN TURUNANNYA SEBAGAI AGEN ANTITUMOR DARAH TERHADAP PENGHAMBATAN PERTUMBUHAN SEL K562, SKRIPSI, FAKULTAS FARMASI, UNIVERSITAS SETIA BUDI, SURAKARTA.

Dilaporkan bahwa turunan kurkumin baru dapat menekan pertumbuhan sel tumor darah. Tujuan penelitian ini yaitu mengetahui sifat fisika kimia turunan kurkumin yang berpengaruh terhadap aktivitas antitumor sel darah yang dinyatakan sebagai model persamaan HKSA terbaik.

Penelitian ini menggunakan senyawa kurkumin dan dua belas turunannya yang telah memiliki parameter aktivitas antitumor sel darah (K562) sebagai IC₅₀. Parameter sifat fisika kimia seri senyawa kurkumin dan turunannya sebagai deskriptor meliputi muatan bersih atom pada struktur kerangka induk kurkumin, E_{HOMO}, E_{LUMO}, Log P, E_{Hid}, a, MR, Volume, Luas permukaan (SA), E_{NErgi} Total, momen dipol (u), Hf, dan Massa yang merupakan hasil perhitungan optimasi geometri menggunakan metode semiempiris PM3 dengan aplikasi *hyperchem*. Model persamaan HKSA dibangun menggunakan analisis perhitungan statistic BuilQSAR. Model persamaan HKSA terbaik selanjutnya dilakukan validasi internal dan eksternal.

Berdasarkan perhitungan analisa statistic dengan BuldQSAR, diperoleh deskriptor yang memiliki pengaruh paling besar yaitu muatan bersih atom, E_{HOMO}, luas permukaan, momen dipol dan Hf dengan persamaan regresi linear:

Log 1/IC₅₀ : + 1.7622 (± 0.3655) qC4 - 0.9457 (± 0.1047) E_{Homo} + 0.0013 (± 0.0002) SA + 0.0575 (± 0.0216) u - 0.0068 (± 0.0004) Hf - 11.4161 (± 1.0440)

, n = 10; R = 0.999; R² = 0,9990; SPress = 0.0232, serta persamaan regresi non linear :

Log 1/IC₅₀ = + 15.1400 (± 4.9008) qC7 + 7.4959 (± 5.6081) qC8 - 0.5839 (± 0.1397) qC15 + 0.0005 (± 0.0003) SA - 0.0054 (± 0.0008) Hf - 5.7246 (± 3.2476), n = 10; R = 0,999, R² = 0,9977; SPress = 0.0341.

Kata Kunci : Senyawa turunan kurkumin, Hubungan Kuantitatif Struktur dan Aktivitas (HKSA), Anti tumor, *Hyperchem*, IC 50.

ABSTRACT

ASTUTI, S., 2022, STUDY OF QUANTITATIVE STRUCTURE-ACTIVITY RELATIONSHIP (QSAR) OF CURCUMINE COMPOUNDS AND DERIVATIVES AS ANTITUMORIC AGENTS OF BLOOD ON GROWTH INHIBITION OF K562 CELLS, THESIS, FACULTY OF PHARMACEUTICAL, SETIA BUDI UNIVERSITY, SURAKARTA.

It was reported that a new curcumin derivative can suppress the growth of blood tumor cells. Purpose of this study is to determine the physical and chemical properties of curcumin derivatives that give affect to antitumor activity of blood cells which were expressed as the best HKSA equation model.

This study used curcumin and twelve derivatives which have antitumor activity parameters of blood cells (K562) as IC₅₀. Parameters of physicochemical properties of curcumin compounds series and their derivatives as descriptors include net charge of atoms in the curcumin framework structure, E_{HOMO}, E_{LUMO}, Log P, E_{Hid}, a, MR, Volume, Surface area (SA), Total Energy, dipole moment (u), Hf, and Mass which are the results of geometric optimization calculations using the PM3 semiempirical method with hyperchem application. HKSA equation model was built using the BuilQSAR statistical calculation analysis. The best HKSA equation model is then validated internally and externally.

Based on the calculation of statistical analysis with BuldQSAR, the descriptor that has the most influence is obtained, namely net atomic charge, E_{HOMO}, surface area, dipole moment and Hf with linear regression equation:

Log 1/IC₅₀ : + 1.7622 (± 0.3655) qC4 - 0.9457 (± 0.1047) E_{Homo} + 0.0013 (± 0.0002) SA + 0.0575 (± 0.0216) u - 0.0068 (± 0.0004) Hf - 11.4161 (± 1.0440)

, n = 10; R = 0.999; R² = 0.9990; SPress = 0.0232. as well as non-linear regression equation :

Log 1/IC₅₀ = + 15.1400 (± 4.9008) qC7 + 7.4959 (± 5.6081) qC8 - 0.5839 (± 0.1397) qC15 + 0.0005 (± 0.0003) SA - 0.0054 (± 0.0008) Hf - 5.7246 (± 3.2476), n = 10; R = 0.999, R² = 0.9977; SPress = 0.0341.

Keywords: *Curcumin derivatives, Quantitative Structure - Activity Relationship (QSAR), Anti-tumor, Hyperchem, IC 50*