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Binding affinity of steroid molecules from Sri Lankan flora to corticosteroid-binding globulin receptor using QSAR Analysis

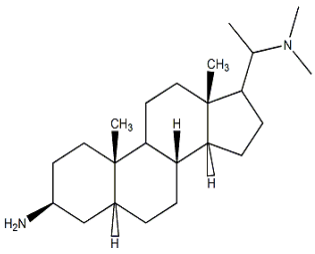
S Rathnayake and S Weerasinghe

Department of Chemistry, Faculty of Science, University of Colombo, Colombo 03

The "Sri Lankan Flora" web based information system, which contains nearly 200 chemical compounds isolated and identified from flora of Sri Lanka was created and hosted under the www.science.cmb.ac.lk/tools/slflora web address. This information system comprised basic computational parameters for each compound and several structural parameters that can be used in Quantitative Structure Activity Relationship (QSAR) analysis. Experimentally found binding affinities of 30 different steroids to corticosteroid-binding globulin (CBG) receptor together with calculated seven different structural parameters (log P, polar surface area, solvent accessible surface area, □ energy, molecular volume, molecular polarizability and molar refractivity) were incorporated to construct QSAR model using multiple linear regression (MLR) technique. The constructed model has the functional form of;

$$\text{Binding Affinity} = a_0 + (a_1 \times \log P) + (a_2 \times PSA) + (a_3 \times SASA) + (a4 \times PiE) + (a_5 \times V) + (a_6 \times MP) + (a_7 \times MR)$$

where a_i's are numerical coefficients obtained from MLR calculation and the other symbols represent calculated structural parameters. Finally, the constructed QSAR model was used to predict binding affinity of seven steroids found from Sri Lankan Flora database. One steroid namely, chonemorphine shows a good binding affinity with CBG receptor while the other six steroids predict binding affinities out of range of the constructed QSAR model. It is interesting to note that the steroid, chonemorphine reportedly having anti-amoebic activity and this molecule was isolated from the plant: *Chonemorpha fragrans* (native name: bulu wal anguna). Further studies stability of receptor-steroid complex in aqueous medium using molecular docking and molecular simulation techniques are already underway.



chonemorphine

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weera@chem.cmb.ac.lk Tel: +94 714488750