Abstract

Organic compounds are known for their noteworthy therapeutic potential. A definite type of organic compounds, are being considered for new medicinal entities are Oxadiazoles derivatives. The 1,3,4 Oxadiazole derivatives having piperidine and Sulphonamides group (7n-7q) were estimated as inhibitor of acetylcholinesterase (an enzyme which is responsible for neurological disorders such as Alzheimer's disease) with the support of computational methods, like DFT, molecular docking and ADMET. By combining these techniques together, speedy screening and optimization of desired drug candidate can be aided thus enabling the process of drug designing. The compounds were optimized by 6-31G (d, p) with basic set and B3LYP level of DFT with Gaussian softwares. To study the chemical stability and reactivity Frontier Molecular Orbital (FMO) analysis was performed by utilizing same theoretical level. The HOMO, LUMO energy levels and energy differences ΔE attained from FMO analysis used to calculated global reactivity parameters. In order to define the reactive sites, the MEP analysis was conducted to evaluate nucleophilic and electrophilic sites and positive and negative electrostatic potential. NBO analysis offered understanding about the electronic structure and orbital interactions of compound to get further insight about reactivity and stability. The binding affinities and docking scores was calculated by performing molecular docking using Discovery studio, AutoDock and Autodock Vina. Four compounds were docked against acetylcholinesterase out of them 7n had the highest binding affinity as compared to other derivatives. The physicochemical properties were analyzed by molinspiration and data warrior and the pharmacokinetic and pharmacodynamic properties were predicted using Swiss ADME and pre ADMET. It is expected that the contribution made by this work will play a significant role in the pharmaceutical design and discovery field, providing a rudimentary guideline in the medicinal chemistry field.