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The Thesis Submitted for the Degree of Master of Science
(In the field of Organic Chemistry)

Impact evaluation of some lung cancer drugs on inhibiting the accessory protein ORF۸ of SARS-CoV-۲ using virtual screening based on molecular docking

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Abstract

Berberines are alkaloid salt found in varieties of barberry. The Berberine and its derivatives as a herbal medicine with effective potential in lung cancer were investigated along with a number of drugs approved for Non-Small Cell Lung Cancer (NSCLC) to evaluate the best binding sites for ORF٨ protein inhibition. Two valid codes ٧JTL and ٧JX٦ related to this auxiliary protein of SARS-CoV-٢, which plays a significant role in the transmission of the corona virus and its spread in the host's body, were used for docking. In this research, using quantum calculations, the structure of berberine and some of its derivatives were optimized along with a number of NSCLC drugs. Then, the molecular docking of these derivatives as an inhibitor for ORF٨ protein with ٢ codes ٧JTL and ٧JX٦ was done with MOE software and the results were analyzed. It was found that in general, these compounds with ٧JTL code have better results. In the case of berberine derivatives, the compound of dihydroberberine with ether or alcohol substitution at carbon number ٨ has the best energy. It was observed that in addition to hydrogen bonding, van der Waals interactions, halogen bonding, and C-H-π interaction can also be effective in protein inhibition, which defines the role of substitution groups in stable compounds of dihydroberberine. ADMET parameters were also investigated, and it was found that berberine derivatives, especially dihydroberberine compounds with dihydroberberine in the ٨th position, have better bioavailability results than the investigated NSCLC medicinal compounds, and they can be consumed orally due to their non-toxicity.

Keywords: Berberine derivatives, NSCLC drugs, Molecular Docking, ORF٨ protein, Inhibitor, ADMET