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Synthesis, computational study, and molecular docking of new (*E*)-4,7-dimethoxy-5-(2-phenyl-2,3-dihydrobenzo[*b*][1,4]thiazepin-4-yl) benzofuran-6-ol derivatives as potential Alzheimer's disease inhibitors

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ABSTRACT α,β-Unsaturated ketones **4a-c** were synthesized from Khellin (**1**) and converted into (*E*)-4,7-dimethoxy-5-(2-phenyl-2,3-dihydrobenzo[b][1,4] derivatives of thiazepin-4-yl)benzofuran-6-ol (**6a-c**) by reaction with 2-aminobenzothiol (**5**) in an acidic medium. Density functional theory/P3LYP theoretical calculations were carried out to verify the reaction mechanism for the formation of **6**. According to molecular docking studies, these compounds serve as promising acetylcholinesterase (AChE) inhibitors, making them powerful agents for greater control in treatment development for neuronal degenerative disorders. Theoretical modeling studies indicate that these compounds have substantial binding affinities with the AChE active site. Their absorption, distribution, metabolism, excretion, and toxicity (ADMET) profiles, bioactivity scores, and medicinally relevant physicochemical properties were also thoroughly evaluated. The evaluations indicate that all derivatives should have good pharmacokinetic qualities and be non-carcinogenic.

KEYWORDS AChE protein, ADMET properties, Anticholinesterase activity, Benzodiazepine, Docking study.

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