Synthesis, Anticancer Activity, and Molecular Docking of New 1,2,3-Triazole Linked Tetrahydrocurcumin Derivatives

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Abstract

Cancer is one of the deadliest diseases to humanity. There is significant progress in treating this disease, but developing some drugs that can fight this disease remains a challenge in the field of medical research. Thirteen new 1,2,3-triazole linked tetrahydrocurcumin derivatives were synthesized by click reaction, including a 1,3-dipolar cycloaddition reaction of tetrahydrocurcumin baring mono-alkyne with azides in good yields, and their in vitro anticancer activity against four cancer cell lines, including human cervical carcinoma (HeLa), human lung adenocarcinoma (A549), human hepatoma carcinoma (HepG2), and human colon carcinoma (HCT-116) were investigated using MTT(3-(4,5-dimethylthiazole-2-yl)-2,5-diphenyltetraz-olium bromide) assay. The newly synthesized compounds had their structures identified using NMR HRMS and IR techniques. Some of prepared compounds, including compounds 4g and 4k, showed potent cytotoxic activity against four cancer cell lines compared to the positive control of cisplatin and tetrahydrocurcumin. Compound 4g exhibited anticancer activity with a IC50 value of 1.09 ± 0.17 µM against human colon carcinoma HCT-116 and 45.16 ± 0.92 µM against A549 cell lines compared to the positive controls of tetrahydrocurcumin and cisplatin. Moreover, further biological examination in HCT-116 cells showed that compound 4g can arrest the cell cycle at the G1 phase. A docking study revealed that the potential mechanism by which 4g exerts its anti-colon cancer effect may be through inhabiting the binding of APC–Asef. Compound 4g can be used as a promising lead for further exploration of potential anticancer agents.