Abstract

Introduction

Cancer is the second leading cause of death in worldwide and is responsible for 9.6 million cancer-related deaths each year (approximately 1 in 6 people). Drugs are used to treat cancer have limitations such as long treatment period, high cost, drug resistance, and high toxicity. Therefore, drug development in the field of cancer treatment is essential. In this study, designed and synthesized new 1,2,3,4-tetrahydropyrimidine-1,2,3-triazole hybrid derivatives and their cytotoxicity activity was evaluated against MCF-7, HepG-2 and A549 cell lines.

Materials and methods

In this study, a series of hybrid derivatives were designed and synthesized through Biginelli and Click reactions in three steps. After purification of the synthesized derivatives, their chemical structures were identified and confirmed by ^{1}H-NMR, FT-IR and Mass spectroscopy techniques. Then, their cytotoxicity activity was evaluated against MCF-7, HepG-2 and A549 cell lines.

Results

According to the results, compound benzyle 4-{4-[(1-benzyl-1H-1,2,3-triazol-4-yl)methoxy] phenyle}-6-methyl-2-oxo-1,2,3,4-tetrahydropyrimidine-5-carboxylate (S6), having the thioxo group in the C2 position and the benzyl carboxylate group in the C5 position of the tetrahydropyrimidine ring, had the highest activity amoung other compounds against the two cell lines (Hep-G2 cell line IC_{50} = 45.9 ± 0.16 μM and MCF-7 cell line with IC_{50} = 80.5 ± 0.07 μM). In addition, screened compounds showed no activity against A549 cell line.

Discussion and conclusion

The investigation of the structure and activity relationship shows that the hybrid derivatives of 1,2,3-triazole-1,2,3,4-tetrahydropyrimidine with higher lipophilicity groups such as thioxo in the C2 position of tetrahydropyrimidine ring and also the bulk moieties in C5 position of this ring shows higher cytotoxic activity compared to other compounds against tested the cell lines.

Keyword: Multicomponent reactions, Click reaction, Biginelli reaction, Hybrid derivatives, Anti-cancer