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Synthesis, characterization and cytotoxicity appraisal of original 1, 2, 3-Triazole derivatives, against breast cancer cell lines (MDA-MB-231)

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Abstract: The present study established the efficient separate synthesis of four unique 1, 2, 3-triazole derivatives (M1, M2, M3, M4) via conducting 1,3-dipolar cycloaddition of N-((4-azidophenyl) sulfonyl) acetamide, with substituted N-phenylmaleimide. FTIR, 1H NMR, 13C NMR, and mass spectra were utilized for the characterization of the triazoles. The cytotoxic activities of these compounds, with regards to breast cancer cell lines (MDA-MB-231), were then evaluated. The cytotoxicity pre-screening outcomes for 100 µM portrayed a variety of actions, while the IC50 values with concentrations of 0-500 µM for 48 hours, the results are 2.542, 2.929, 2.429, and 2.864 µM for the compounds M1, M2, M3, and M4 respectively. Remarkably, the M2 and M4 *para*-substituted compounds exhibited superior IC50 values, in comparison to the M1 and M3 *ortho*-substituted compounds. This suggests that the M1 and M3 compounds have the potential to perform as against breast cancer.

Keywords: heterocyclic; 1,2,3-Triazole; 1, 3-dipolar cycloaddition; cytotoxicity; MTT assay; breast cancer.

1. Introduction

Triazole derivatives are most recommended compounds in the field of medicinal chemistry and drug discovery [1,2]. Several studies grasped the route of triazoles to reveal an innovative anti-inflammatory [3], antifungal [4], anticancer [5], inhibitor [6] and herbicidal [7]. The antioxidant and free radical scavenging activity of triazole derivatives are reported [8,9], and there are indications that these derivatives can influence the development of breast cancer [10,11]. Kassem A. F. *et al.* designed a sequence of triazole glycosides that comes with appreciable anti-breast cancer activities (MCF-7) [12]. The synthesis of a series of triazoles by Gilandoust M. *et al.* assisted in providing inhibition against the progress of VEGFR1 [13]. Rodarraju R. *et al.*, utilized nucleoside derivatives to elaborate a triazole that comes with a cytotoxic impact on MCF-7 cells [14]. The purpose of the present work is to synthesize some 1,2,3-triazole derivatives in order to evaluate their action against MDA-MB231 breast cancer cells line Scheme 1 exhibits the chemical configuration of the synthesized compounds.

2. Results and Discussion

2.1. Chemistry

Cycloaddition reactions are commonly utilized to combine unsaturated molecules with the formation of heterocyclic compounds [15]. We applied 1,3-cycloaddition reaction for a three-stage synthesis of the compound derived from 1,2, 3-triazole. The initial stage requires prepare of substituted azide from N-((4-aminophenyl)sulfonyl)acetamide. The following stage involves the preparation of N-phenyl maleimide derivatives. Then last stage, M1, M2, M3 and M4 compounds are synthesised through 1,3-dipolar cycloaddition reaction of N-(4-Azido phenyl sulfonyl)acetamide with N-phenyl maleimide derivatives. Scheme 1 shows the three stages of this synthesis process. FTIR, NMR and mass spectra were utilized for the characterization of the four compounds.

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