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Research Article

Synthesis and Anticancer Activities of 4-[(Halophenyl)diazenyl]phenol and 4-[(Halophenyl)diazenyl]phenyl Aspirinate Derivatives against Nasopharyngeal Cancer Cell Lines

Boon Kui Ho,[1] Zainab Ngaini,[1] Paul Matthew Neilsen,[2,3] Siaw San Hwang,[2] Reagan Entigu Linton,[2] Ee Ling Kong,[2] and Boon Kiat Lee[2]

[1]*Department of Chemistry, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia*
[2]*Cancer Research and Advanced Therapeutic Group (CREATE), Faculty of Engineering, Computing and Science, Swinburne University of Technology Sarawak Campus, Jalan Simpang Tiga, 93350 Kuching, Sarawak, Malaysia*
[3]*School of Health, Medical and Applied Sciences, Central Queensland University, North Rockhampton, QLD 4702, Australia*

Correspondence should be addressed to Zainab Ngaini; nzainab@unimas.my

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Aspirin and azo derivatives have been widely studied and have drawn considerable attention due to diverse biological activities. In this study, a series of 4-[(halophenyl)diazenyl]phenyl aspirinate derivatives were synthesized from the reaction of aspirin with 4-[(halophenyl)diazenyl]phenol via esterification, in the presence of DCC/DMAP in DCM with overall yield of 45–54%. 4-[(Halophenyl)diazenyl]phenol was prepared prior to esterification from coupling reaction of aniline derivatives and phenol in basic solution. All compounds were characterized using elemental analysis, FTIR, and ^{1}H and ^{13}C NMR spectroscopies. All compounds were screened for their anticancer activities against nasopharyngeal cancer (NPC) HK-1 cell lines and the viability of cultured cells was determined by MTS [3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxylmethoxylphenyl)-2-(4-sulfophenyl)-2H-tetrazolium]-based colorimetric assay. 4-[(E)-(Fluorophenyl)diazenyl]phenol showed the highest anticancer activity against NPC HK-1 cell lines compared to other synthesized compounds. 4-[(Halophenyl)diazenyl]phenyl aspirinate showed low cytotoxicity against NPC HK-1 cell lines compared to 4-[(halophenyl)diazenyl]phenol but better anticancer activity than aspirin alone.

1. Introduction

Cancer has become a serious clinical problem worldwide [1]. It is because cancer cells have the ability to grow rapidly and develop into malignancy tumor [2]. Nasopharyngeal cancer is the most common malignant tumor and occurs in the nasopharynx, the upper part of the throat near to the neck [3]. Nasopharyngeal cancer (NPC) is commonly developed from infection with Epstein-Barr virus, foods, and family history [4]. NPC, which also known as HK-1, was found to have high level of epidermal growth factor receptor (EGFR) protein [5]. Hence, by targeting the EGFR protein, it might become a new therapeutic strategy to inhibit the HK-1 cells [6]. The usage of drugs could stop the growth of the malignant cells in one's body by inhibiting its EGFR pathway of the cancer cells itself [7].

The development of new drug for cancer treatment has gained much interest in recent years. The modification of pharmacologically active compounds may lead to a new finding of novel drugs with diverse pharmacological activities [8]. Chemical modification of aspirin, for instance, has been reported to reduce gastrointestinal toxicity and exhibited diverse biological activities such as anticancer [9], anti-inflammatory [10], and antibacterial [11, 12] activities. Aspirin