งานวิจัย เรื่อง Antiplasmodial dimeric chalcone derivatives from the roots of Uvaria siamensis

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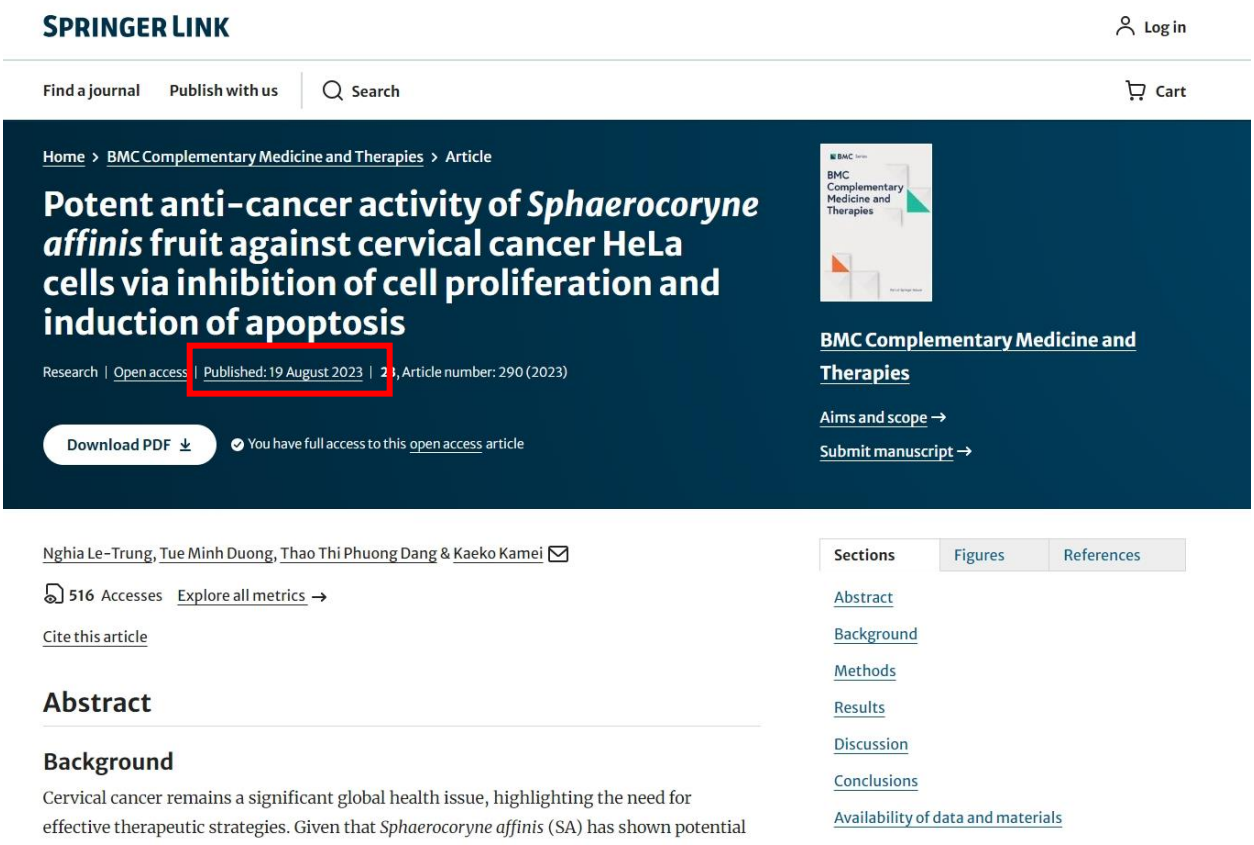

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RESEARCH Open Access

Potent anti-cancer activity of *Sphaerocoryne affinis* fruit against cervical cancer HeLa cells via inhibition of cell proliferation and induction of apoptosis

Nghia Le-Trung[1], Tue Minh Duong[1], Thao Thi Phuong Dang[2] and Kaeko Kamei[1*]

Abstract

Background Cervical cancer remains a significant global health issue, highlighting the need for effective therapeutic strategies. Given that *Sphaerocoryne affinis* (SA) has shown potential anti-cancer activity in several cancer types, herein, we investigate the effects of SA fruit (SAF) on human cervical cancer HeLa cells and their underlying mechanisms of action.

Methods SAF extract cytotoxicity was assessed in various cancer cell lines. The effects of the hexane fraction (SAF-Hex) on HeLa cell viability, cell cycle protein expression, apoptosis, and DNA damage were evaluated using cytotoxicity assays, Western blotting, quantitative PCR, 4′,6-diamidino-2-phenylindole (DAPI) staining, and a terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) assay.

Results SAF-Hex selectively inhibited HeLa cell viability with an IC50 of 4.20 ± 0.36 μg/mL and a selectivity index of 5.11 ± 0.58. The time-dependent cytotoxicity assay showed decreased cell survival after 48 h of treatment, accompanied by morphological changes and apoptotic bodies in HeLa cells. SAF-Hex also suppressed HeLa cell cycle proteins (Cyclin E, CDK2, and CDK1), reduced *PCNA* transcription, and diminished AKT and mTOR activation, thus inhibiting cell proliferation. The increased γH2AX expression, DNA fragmentation, and caspases-3 and -9 activation indicated SAF-Hex-induced DNA damage and apoptosis. However, the BAX/BCL-2 ratio remained unchanged, and *BAX* and *BCL2* expression was attenuated.

Conclusion SAF-Hex effectively inhibits HeLa cell proliferation and induces DNA damage in that cervical cancer cell line activating apoptosis through the intrinsic pathway. Interestingly, the BAX/BCL-2 ratio remained unchanged while *BAX* and *BCL2* transcription was attenuated. Hence, further research is required to explore this unexpected finding and facilitate the development of novel therapies targeting cervical cancer HeLa cells.

Keywords Anti-cancer, Apoptosis, Cervical cancer, DNA damage, HeLa cells, *Sphaerocoryne affinis*

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Background

Cervical cancer ranks as the fourth most common cancer and the leading cause of cancer-related deaths among women [1]. Human papillomavirus (HPV) is the primary factor in cervical cancer development, with smoking, high parity, long-term use of oral contraceptives, and sexually transmitted diseases acting as cofactors.

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Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12906-023-04127-0.

Additional file 1: Fig. S1. Original images of blots shown in Fig. 2A. **Fig. S2.** Original images of blots shown in Fig. 3A. **Fig. S3.** Original images of blots shown in Fig. 4A. **Fig. S4.** Western blotting of caspase-8.

Additional file 2: Table S1. Antibodies for Western Blot Assay. **Table S2.** Primers for qPCR.

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Authors' contributions
Conceptualization: N.L., T.D.T.P., and K.K.; Investigation: N.L., D.M.T.; Methodology: N.L.; Project administration: K.K.; Supervision: K.K.; Discussion of the results: N.L., D.T.P.T., and K.K.; Writing—Original Draft: N.L.; Writing—Review and Editing: N.L., D.T.P.T., and K.K.; All authors have read and agreed to the published version of this manuscript.

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Availability of data and materials
The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The plant material used in this study, SAF (Chùm Đuông in Vietnamese), was purchased from a country market in Tay Ninh province, Vietnam. It was identified by Dr. Dang Le Anh Tuan from the Laboratory of Botany, Department of Ecology and Evolutionary Biology, Faculty of Biology—Biotechnology, University of Science, VNU-HCMC, Vietnam. A voucher specimen (PHH0004912) has been deposited and is available for reference. The collection and use of this plant material comply with the IUCN Policy Statement on Research Involving Species at Risk of Extinction and the Convention on the Trade in Endangered Species of Wild Fauna and Flora.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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