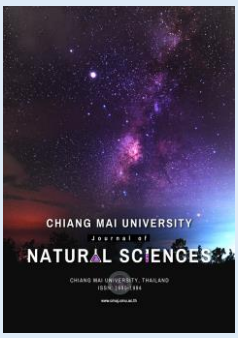

Editor:
Korakot Nganvongpanit,
Chiang Mai University, Thailand

Article history:
Received: December 11, 2020;
Revised: January 15, 2021;
Accepted: January 21, 2021;
Published online: March 15, 2021

Corresponding author:
Wipob Suttana,
E-mail: wipob.sut@mfu.ac.th

Research article

Antiproliferative and Apoptosis-Inducing Activities of Benchalokawichian Remedy Against Doxorubicin-Sensitive and -Resistant Erythromyelogenous Leukemic Cells

Wipob Suttana[1,*], Chatubhong Singharachai[2], Rawiwan Charoensup[3, 4], Narawadee Rujanapun[4], and Chutima Suya[5]

1 Department of Biomedical Science, School of Health Science, Mae Fah Luang University, Chiang Rai 57100, Thailand
2 Department of Public Health, School of Health Science, Mae Fah Luang University, Chiang Rai 57100, Thailand
3 Department of Applied Thai Traditional Medicine, School of Integrative Medicine, Mae Fah Luang University, Chiang Rai 57100, Thailand
4 Medicinal Plants Innovation Center, Mae Fah Luang University, Chiang Rai 57100, Thailand
5 Department of Medical Technology, Chiangrai Prachanukroh Hospital, Chiang Rai 57000, Thailand

Abstract Chemotherapy can cause multidrug resistance in cancer cells and is cytotoxic to normal cells. Discovering natural bioactive compounds that are not cytotoxic to normal cells but inhibit proliferation and induce apoptosis in drug-sensitive and drug-resistant cancer cells could overcome these drawbacks of chemotherapy. This study investigated the antiproliferative effects of crude extracts of Benchalokawichian (BLW) remedy and its herbal components against drug-sensitive and drug-resistant cancer cells, cytotoxicity of the extracts toward normal cells, and their ability to induce apoptosis and cell cycle arrest in drug-sensitive and drug-resistant cancer cells. The extracts exhibited antiproliferative activity against doxorubicin-sensitive and doxorubicin-resistant erythromyelogenous leukemic cells (K562 and K562/adr). *Tiliacora triandra* root, BLW, and *Harrisonia perforata* root extracts displayed an IC_{50} of 77.00 ± 1.30, 79.33 ± 1.33, and 87.67 ± 0.67 µg/mL, respectively, against K562 cells. In contrast, *Clerodendrum petasites*, *T. triandra*, and *H. perforata* root extracts displayed the lowest IC_{50} against K562/adr cells (68.89 ± 0.75, 78.33 ± 0.69, and 86.78 ± 1.92 µg/mL, respectively). The resistance factor of the extracts was lower than that of doxorubicin, indicating that the extracts could overcome the multidrug resistance of cancer cells. Importantly, the extracts were negligibly cytotoxic to peripheral mononuclear cells, indicating minimal adverse effects in normal cells. In addition, these extracts induced apoptosis of K562 and K562/adr cells and caused cell cycle arrest at the G0/G1 phase in K562 cells.

Keywords: Antiproliferative, Apoptosis, Benchalokawichian, Cell cycle, Multidrug resistance

Funding: This research was supported by grants from Mae Fah Luang University.

Citation: Suttana, W., Singharachai, C., Charoensup, R., Rujanapun, N., and Suya, C. 2021. Antiproliferative and apoptosis-inducing activities of benchalokawichian remedy against doxorubicin-sensitive and -resistant erythromyelogenous leukemic cells. CMU J. Nat. Sci. 20(3): e2021056.