

Blumea balsamifera (L.) DC. elicit anti-kinase, anti-phosphatase and cytotoxic activities against acute promyelocytic leukemia cells (HL-60)

ABSTRACT

Blumea balsamifera (L.) DC. (*B. balsamifera*) extract has been shown to exhibit many biological activities. However, the anti-kinase, anti-phosphatase and cytotoxic activities of *B. balsamifera* are not well understood. Therefore, this study aimed to investigate the anti-kinase and antiphosphatase activities using MKK1, MSG5 and PP1 screening systems. Cytotoxic activity was evaluated using acute promyelocytic leukemia cell lines (HL-60). Methanol extracts of *B. balsamifera* were partitioned into hexane (HE), chloroform (CE), chloroform-methanol (CME), butanol (BE) and aqueous fractions (AQE). Only the CE fraction demonstrated toxic activity against PP1 screening system. Other fractions did not show activity in PP1 screening. CE fractions were further fractionated using silica gel chromatography and a further 11 fractions were obtained. Fraction 2 (CE.F2) showed activity against PP1 and was further fractionated and tested. CE.F2.F6.F3 fraction tested positive against PP1. Inhibition of PP1 by the F2.F6.F3 fraction was further confirmed using an enzymatic reaction and the V_{max} and K_m constants were 124.999 $\mu\text{mol/ml.min}$ and 204.624 μM , respectively. A Lineweaver-Burk plot outcome of F2.F6.F3 revealed decreasing of K_m and V_{max} values which supported the inhibition of PP1 activities. Cytotoxic activities against HL-60 were observed for the CE, CE.F1, CE.F2 and CE.F7 fractions. We have demonstrated that *B. balsamifera* and its specific fractions exhibited anti-kinase and anti-phosphatase activities. These substances have the potential to be used as treatment agent for acute promyelocytic leukemia.