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Xanthorrhizol induces apoptosis via the up-regulation of Bax and p53 in the human cervical cancer cell line HeLa

Norzila Ismail, Azimahtol Hawariah Lope Pihie

Department of Biochemistry, School of Biosciences & Biotechnology, Faculty of Science & Technology, University Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia
E-mail: norzila80@yahoo.com

Xanthorrhizol is a sesquiterpenoid compound extracted from *Curcuma xanthorrhiza* that is also known as Temulawak. *C. xanthorrhiza* was found to have antibacterial, anticancer and anti-inflammatory activity. The rhizome has also been used to treat inflammation in postpartum uterine bleeding. Cervical cancer chemotherapy in vivo improved in cases with high p53 expression in the tumor tissue. Apoptosis is the ability of a cell to self-destruct by the activation of an intrinsic cellular program when the cells are seriously damaged or no longer needed. There is much evidence to show that most of cancer therapy drugs kill the tumor cells through apoptosis. Bax is a protein from the bcl-2 family which has been associated with apoptotic cell death *in vitro* and *in vivo*. The ratio of various bcl-2 family members controlled the apoptosis. Antiproliferative assay using methylene blue staining revealed that xanthorrhizol inhibited the proliferation of cervical cancer cell line HeLa with EC_{50} value 6.16μg/ml. Xanthorrhizol significantly increased apoptosis in HeLa cells, as evaluated by the Tdt-mediated dUTP nick end-labeling (TUNEL) assay and nuclear morphology by Hoechst 33258 staining. Western blot analysis which was confirmed with the immunostaining results elucidated the up-regulation of tumor supressor protein p53 and the proapoptotic protein bax, due to the treatment of xanthorrhizol. Xanthorrhizol, however, did not affect the expression of the anti-apoptotic protein, Bcl-2 and the viral oncoprotein E6. From this study, it is suggested that xanthorrhizol induces apoptosis in cervical cancer cell lines HeLa by normalized the function of p53 protein and therefore increased the expression of bax protein; resulting the suppression of bcl-2 protein. Xanthorrhizol therefore, could possibly be a potent antiproliferative and anticancer agent on HeLa cells through the modulation of bax and p53 expression.