

# 3-*O*- $\beta$ -D-Galactopyranoside of Quercetin as an Active Principle from High Altitude *Podophyllum hexandrum* and Evaluation of its Radioprotective Properties

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The aqueous-ethanolic extract (AEE) of high altitude *Podophyllum hexandrum* has earlier been reported to render a radioprotective effect against lethal gamma radiation in *in vitro* model. AEE has also been reported to possess metal chelating and DNA protecting properties. The present study was undertaken to isolate and characterize the bioactive principle present in AEE and investigate its role in radiation protection. A novel molecule was found to be present in AEE and was assigned as 3-*O*- $\beta$ -D-galactoside of quercetin by acid hydrolysis, LC-MS, LC-APCI-MS/MS and <sup>13</sup>C NMR spectra. Various biological activities were investigated at *in vitro* level. The antioxidant potential of AEE in lipid and aqueous phase was determined against numerous stresses. AEE was found to be significantly ( $p < 0.05$ ) protective, *i.e.*, against Fe<sup>2+</sup> and Cu<sup>2+</sup>-induced linoleic acid degradation, respectively. Radiation-induced lipid oxidation studies revealed that AEE maximally works at a [lignan]/0.25 kGy ratio 400 (ratio of concentration of AEE divided by the radiation dose, *i.e.*, 0.25 kGy) and no drug-induced lipid oxidation at all concentrations tested was found. In a time-dependent study, total antioxidant activity was maximally exhibited at 1 mg/ml. The site-specific and non-site-specific deoxyribose degradation assay exhibited a dose-dependant hydroxyl scavenging potential of AEE (0.05–500  $\mu$ g/ml). The anti-lipid peroxidation ability of AEE against radiation (0.25 kGy)-induced lipid peroxidation was higher in case of neural tissue homogenate as compared to kidney homogenate [activity ratio: 0.039 (brain) < 0.24 (kidney)]. The protein protection study using bovine serum albumin was also done for two time intervals (2 h and 4 h) and significant ( $p < 0.05$ ) protection was observed at 500  $\mu$ g/ml (> 97%). This study implies that 3-*O*- $\beta$ -D-galactoside present in AEE renders radioprotection by protecting lipids, proteins in renal and neural model system against supra-lethal (0.25 kGy) gamma radiation.

**Key words:** Radioprotection, Quercetin-3-*O*- $\beta$ -D-galactopyranoside, Lipid Oxidation