

Protective effect of aqueous and ethanoic extracts of *Achillea Wilhelmsii* on oxidative stress induced by trivalent arsenic

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Introduction: Arsenic (As^{3+}) is a toxic metalloid and a potent environmental toxicant that has been reported to cause severe liver injury. Long-term exposure to arsenic through food and contaminated water can result in a chronic As^{3+} poisoning. One of the main hypotheses about the mechanism of As^{3+} toxicity is oxidative stress so that As^{3+} toxicity which may be due to direct reaction of reactive oxygen species with cell biomolecules, causing damages to lipids, proteins, and DNA, hence leading to cell death. In the present study, the protective role of hydro alcoholic and aqueous extract of *Achillea wilhelmsii* (*A. Wilhelmsii*) against liver injury induced by As^{3+} toxicity.

Methods and Results: Hepatocytes were obtained by collagenase perfusion of the liver and their viability was assessed by the trypan blue (0.2% w/v) exclusion test. Cytotoxicity was associated with reactive oxygen species (ROS) formation, lipid peroxidation and loss of mitochondrial membrane potential which were prevented by antioxidants and ROS scavengers (DMSO, mannitol), mitochondrial permeability transition (MPT) pore sealing agent (carnitine) and the ATP generator (L-glutamine), Lysosomal protective agent and glutathione discharge. We used aqueous and hydroalcoholic extracts of *Achillea wilhelmsii* with concentrations 25 μ g/ml, 50 μ g/ml and 100 μ g/ml for 3h to evaluate the protective effect of these extracts on the As^{3+} -induced oxidative stress in isolated rat hepatocytes. Also the protective and antioxidant effects of Quercetin and Gallic acid polyphenols in the *A. Wilhelmsii* have been investigated as control. According to the results, the concentration of As^{3+} , which can cause death of 50% of cells, is equivalent to 50 μ M, that could significantly increase cell death, ROS production, lipid peroxidation induction and mitochondrial membrane slump compared to the control group ($p < 0.05$). *Achillea wilhelmsii* extract could significantly decrease produce ROS, lipid peroxide and loss of mitochondrial membrane decline.

Conclusions:

In the present study, result showed the hepatoprotective role of hydroalcoholic and aqueous extract of *Achillea wilhelmsii* against liver injury induced by arsenic in rats had been studied by determining their effects on decrease produce ROS, lipid peroxide and loss of mitochondrial membrane decline. Because of existence large amounts of flavonoids and polyphenols, including quercetin and Gallic acid in *A. Wilhelmsii* can hepatoprotective effects be attributed to these compounds.

Key words: As^{3+} toxicity, *Achillea wilhelmsii*, liver injury, ROS