Antioxidant Activity of Artemisia Aucheri Sesquiterpene Lactone Extract

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Abstract

The liver is one essential organ in vertebrates and other animals levels serum albumin, LDH, ALP and AST are biomarkers of liver injury. Certain plants use in the treatment of liver. The aim of this study was to investigate the effect of Artemisia aucheri sesquiterpene lactone extract on liver. Therefore, the wistar rats were randomly divided into 6 groups that consisted of: A and B: extract treated (50 and 100 mg/kg), C: extract (50 mg/kg)+10% ethanol, D: extract (100 mg/kg)+10% ethanol, E: negative control (ethanol 10%) that received 10% ethanol, F: control group. Animals treated for 30 days every other day and 3 days after the last treatment the blood samples were collected and AST, ALP, LDH and serum albumin were assayed. The results showed that the mean serum albumin was not similar in all groups, and the highest and lowest mean serum albumin belong to the control group and negative control respectively (p<0.05). Also significant differences in mean liver enzymes were observed in different groups (p<0.05). Treatment groups showed increase of ALP in compared with the negative control group. We can conclude that sesquiterpene lactone compounds, particular parthenenolides have most antioxidant properties.

Keywords: Antioxidant, Artemisia aucheri, Liver enzyme, Sesquiterpene Lactone.

Introduction

Oxidative stress occurs when the free radicals are produced in large amounts or the antioxidant levels are low. Free radicals are reactive molecules that are produced by biochemical natural process of cell metabolism, so that many diseases are caused by these molecules and damage to macromolecules of animal body such as DNA, proteins, lipids and carbohydrates (Ames et al.,1993; Baghnia et al., 2008). Medicinal plants are as rich source of antioxidant (Rahzany et al., 2009).

Artemisia is the largest genus of the family Asteraceae and it comprises around 500 species and grows in various areas of Iran (Babaahmadi et al., 2013). The most of Artemisia species have a distinctive taste and smell that is due to the presence of monoterpene and sesquiterpene compounds (Allahtavakoli et al., 2010). Sesquiterpene lactones are an important compounds of natural products obtained from medicinal plants that they have structural diversity and diverse biological activities such as antioxidant, anti-tumor, anti-inflammatory, anti-malarial, antibacterial, antiviral, antifungal (Chaturvadi, 2011; Yazdani et al., 2013). Anti-inflammatory and antioxidant activities were reported in many Artemisia species, including Artemisia aucheri (Allahtavakoli et al., 2010).

A. aucheri is an aromatic plant that use in traditional medicine for treatment of various diseases such as astringent, antipoisoning, antiseptic, antiparasitic, stimulants, appetizers and reduces the rheumatic pains (Pellicer et al., 2011; Asghari et al., 2012; Gharehmatrossian et al., 2012). Babaahmadi et al (2013) reported that the phosphate-buffered saline extract of Artemisia aucheri flowering tops have an allergenic effect. Moreover its contain santonian, coumarin, flavonoid, which these compounds have antioxidant activity (Farzaneh et al., 2006; Bahrami Karkondi et al., 2010; Dinani et al., 2010). Professionals recommended antioxidants for human health (Siahpoosh et al., 2011). Therefore, the aim of this study was to evaluate the antioxidant activity of Artemisia aucheri extract.

Methodology

Collection of plants

The flowering tops of A. aucheri were collected from Kashan, province of Esfahan, Iran, in September 2012. The voucher specimen was deposited at the herbarium of the research-institute of Esfahan forests and rangelands.
Preparation of extract

The flowering tops of A. aucheri were air-dried under shade and ground in to fine powder using electric blender, then, 40 g of flowers powder were extracted at room temperature with cyclohexane-Et2O-MeOH (1:1:1). The extract was then washed with saltwater; the aqueous layer was subjected to extraction once again with EtOAc, and the organic layer was dried with Na2SO4 and concentrated under reduced pressure (Baltaci et al., 2011). The extracts were dissolved in phosphate buffered saline and tween 80% with ratio of 1 to 4 at concentrations of 50, 100 mg/kg body weight.

Animals

Adult male wistar rats (250-300 g) were obtained from Iran Pastor Institute and divided into 6 groups of eight animals each (48 rats). They were maintained under controlled temperature, 12 h light/12 h dark conditions for 1 week before the start of the experiments for adaptation to laboratory conditions. The procedures in this study were carried out in an accordance with the institution's scientific procedures for animals and was approved by the institutional animal care and use committee. The animals were randomly divided into the groups that were injected intraperitoneally. These groups include the A and B: extract treated (50 and 100 mg/kg), C: extract (50 mg/kg)+10% ethanol, D: extract (100 mg/kg)+10% ethanol, E: negative control that received 10% ethanol, F: control group. The animals were treated for 30 days then they were anesthetized and the blood samples were collected 3 days after the last injection. The biochemical parameters such as AST, ALP, LDH and serum albumin were assayed using autoanalyzer (902 Hitachi Automatic Analyzer, Roche, India).

Statistical analysis

All data were presented as Mean ± SDM. The statistical comparisons were done with (One-Way ANOVA) test by SPSS 18 software.

Results

Comparison the albumin serum in different groups showed that the highest and lowest mean of serum albumin belong to control and negative control groups respectively (p<0.05). Also, level of serum albumin increased significantly in group A (extract 50 mg/kg) in compared with other groups (Figure 1). Moreover levels AST increased significantly (p<0.05) in groups A, B, C and D in compared with control group (Figure 2). In the other hand, ALT level decreased significantly in different groups in compared with control group (p<0.01) (Figure 3). Also, level of LDH decreased in groups C and D (extract 50, 100 mg/kg)+10% ethanol) in compared with control group (p<0.05) (Figure 4).
Discussion and Conclusion

In this study, level of serum albumin decreased in groups C, D and E in compared with other groups; this could be due to liver disorders. Rezaei et al (2013) observed the A. aucheri decreased significantly the level of serum albumin in compared to the control group against thioacetamidked toxicity that this is consistent with our results. Atawodi et al (2011) reported that levels of ALT, AST, ALP increased significantly with A.macivera extract (50, 100 and 200 mg/kg). Therefore, increase of AST in our results indicate liver disorders. Also, the researchers investigated medicinal extract of Artemisia scoparia (150 mg/kg) against toxicity of acetaminophen (640 mg/kg) and they concluded the acetaminophen increased significantly the rate of AST and ALT, whereas, the extract decreased these factors; thus, the extract of this plant contains hepatoprotective constituents (Ghani & Janbaz, 1993).

Taati et al (2011) concluded the jujube fruit extract (100 and 200 mg/kg) prevented from the increase of ALT against ethanol in rats. Kim and Lee (1996) reported that aminotransferase increased with Ethanol at concentration of 5 ml/kg in rats. Whereas, Artemisia selengensis methanol extract (200 mg/kg) decreased significantly the rate of aminotransferase. Therefore, the extract has a possible protective effect on the ethanol-induced hepatotoxicity. In another study, no significant alterations were observed in the AST and ALT in 2% Artemisia abyssinica leaves diet. Whereas, these factors were increased in 10% diet. These results indicated that the sensitivity of the animals to plant materials was dependent on the concentration added to the diet (Adam et al., 2000). The our results showed reduce of LDL level in groups C and D extract (50, 100 mg/kg+10% ethanol) in compared with control group; in fact, these groups reduce the toxic effects of ethanol. Studies have shown that Artemisia has antioxidant effects due to the presence of flavonoid, phenolic and terpene compounds. So that, researchers reported that this plant is contain monoterpenes compounds such as camphor and 1, 8-cineol which these are antioxidant compounds (Amjad et al., 2013). Moreover, the sesquiterpene lactone compounds especially parthenolide, have antioxidant properties (Amjad et al., 2013).

According to the results it seems that the antioxidant activity of Artemisia aucheri sesquiterpene lactone extract attributed to terpene compound, especially sesquiterpene lactones, but according to the toxic effects of A. aucheri extract (50 mg/kg), it seems some toxic compounds (Artemisinin) of this plant are extracted that ingredient to sesquiterpene lactone compound.

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References


