

Comparison Antitussive Activity Echinacea and Artemisia in Mice

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Abstract: Regarding to some pharmacological effects of Echinacea and Artemisia, the aim of present study was comparison their potential antitussive effect. Four groups of mice were used and received normal saline, dextromethorphan, Echinacea extract and Artemisia extract respectively before cough induction. Cough was induced in a 1000 mL special glass chamber with ammonium hydroxide (1 mL of 5% solution) cotton ball. The numbers of cough were counted when mouse was kept for 2 min into the chamber and 5 min out of it. The mean of cough was significantly decreased by dextromethorphan, Echinacea extract and Artemisia extract. But there was no difference between effects of these agents statistically.

Keywords: Artemisia, cough, dextromethorphan, echinacea, mice

INTRODUCTION

Coughing is one of common symptoms related to many respiratory diseases such as asthma, chronic bronchitis, pneumonia (Irwing and Madison, 2000; Ge *et al.*, 2009). Cough is treated by usual drugs such as codeine but real treatment concerns the pathology that induces cough. The problem is not to only use an efficient therapy against coughing, which will bring side effects. In Traditional Medicine, many medicine herbs are used for treat respiratory complaints such as bronchial inflammatory, pneumonia, expectoration and cough. So it is valuable to search for effective medicines for treatment of cough in herbal medicine.

Artemisia absinthium L. (family: Asteraceae) commonly known as wormwood is an aromatic, perennial small shrub. *Artemisia absinthium* is used as an antiseptic, antispasmodic, febrifuge, cardiac stimulant, for the restoration of declining mental function and inflammation of the liver and to improve memory and against acute liver injury (Wake *et al.*, 2000; Guarrera, 2005; Amat *et al.*, 2010). Several flavonol-3-glycosides have been isolated from leaves of *Artemisia absinthium* and identified as quercetin, isorhamnetin, patuletin and spinacetin derivatives (Hoffmann and Herrmann, 1982). *Artemisia absinthium* extracts have demonstrated to possess a strong antiradical and antioxidant activity in vitro (Canadanovic-Brunet *et al.*, 2005), as well as antiparasitic activity in animal model (Caner *et al.*, 2008).

Echinacea purpurea enhances IgG and IgM antibody production and potentiates humoral immunity (Percival, 2000). In addition, this drug stimulates macrophages and increases cytokine production specially interferon gamma. Also, *Echinacea purpurea* stimulates proliferation of T lymphocytes and enhances cellular immunity (Satoshi *et al.*, 2004; Freier *et al.*, 2003; Mishima *et al.*, 2004).

The main medicinally active components of Echinacea include polysaccharides, glycoproteins, caffeic acid derivatives (chicoric acid) and alkalamides (Bauer, 1996). Most of these components have been investigated for their immunomodulating potential and many have been found to enhance macrophage activity (Stimple *et al.*, 1984; Goel *et al.*, 2002a, b). For example, polyglycan constituents have been found to nonspecifically stimulate phagocytosis and can inhibit growth of *Candida albicans* and *Listeria monocytogenes* in mice (Roesler *et al.*, 1991). See *et al.* (1997) and Currier and Miller (2001) observed nonspecific stimulation of natural killer cell activity.

Regarding to some pharmacological effects of Echinacea and Artemisia including anti-inflammatory and immunomodulatory effects, their potential antitussive effect was evaluated at present study.

MATERIALS AND METHODS

This experimental study was conducted in Iran-Ahvaz- Shahid Chamran University in spring of 2012.

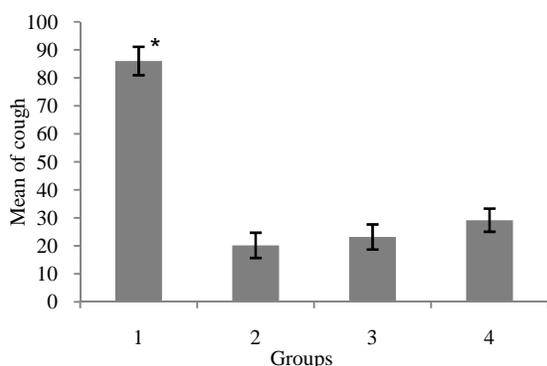


Fig. 1: Mean±SEM of cough in mice (n = 6 each group)
 1: Saline; 2: Dextromethorphan; 3: Artemisia extract;
 4: Echinacea extract; *: Significant difference (p<0.05)

Hydro-alcoholic extract of aerial parts of *Echinacea purpurea* was from Goldaruo Co. Isfahan, Iran. The fresh roots of *Artemisia absinthium* were collected from Kerman-Iran area. They were shade-dried, powdered and after extraction by maceration method in 70% methanol and water.

NMRI mice of either sex were randomly divided into 4 groups of 5 mice each. Animals received normal saline, dextromethorphan 10 mg/kg, Echinacea extract 500 mg/kg and Artemisia extract 50 mg/kg, respectively before cough induction. All drugs were orally administrated by feeding tube. The mice were exposed to a 1000 mL special glass chamber with 5% ammonium hydroxide (1 mL) cotton ball after 30 min of the last administration and the cough incubation period was recorded. After 2 min, the mice were taken out from the chamber and placed in a beaker and the frequency of cough within 5 min was observed and recorded (Li *et al.*, 2012). Cough in mice is that opening the mouth accompanying sound of coughing.

The antitussive results are expressed as mean±Standard Error of Mean (SEM). Significance was evaluated using the Student's t-test. Statistical significance between groups was determined using SPSS program (USA, version16). The minimum level of significance was p<0.05.

RESULTS

The mean of cough was 86±6.05 in group of mice which received saline. The mean of cough was significantly decreased by dextromethorphan and reached to 20.16±4.51 (p<0.001). Artemisia extract significantly depressed cough (p<0.001) and the mean of cough was 23.16±4.46. Echinacea extract significantly decreased coughing (p<0.001) and the

mean of cough was 29.16±4.11. But there was no difference between effects of these agents statistically (Fig. 1).

DISCUSSION

The primary objective of this study was to evaluate the antitussive effect of *Echinacea purpurea* and *Artemisia absinthium* extract to provide experimental evidence for its traditional use. Their antitussive effects were measured using murine model of ammonia induced cough. These extracts significantly inhibited cough frequency of cough in mice induced by ammonia.

Artemisia absinthium extracts have a strong antiradical and antioxidant activity (Canadanovic-Brunet *et al.*, 2005). *Echinacea purpurea* has anti-inflammatory effects (Barrett, 2003). Moreover, *Echinacea* has anti-oxidative and free-radical scavenging activity. The antitussive effect of these extracts may be related to their active compounds including flavonoids and polysaccharides. *Echinacea* is used for treatment of acute upper respiratory infections including common cold and influenza (Hu and Kitts, 2000; Barrett, 2003; Steven and Kejian, 2004). In one study, *Echinacea purpurea* root increased levels of interleukine 1 and 6, tumor necrosing factor and antibody production more than extracts of *Echinacea angustifolia* and *Echinacea pallida* (Skarek *et al.*, 1996). Bukovsky *et al.* (1995) reported that ethanolic extract of *Echinacea purpurea* increased activity of mouse peritoneal macrophage following 5 days exposure (Bukovsky *et al.*, 1995). In one double-blinded study in 24 men, oral administration of *Echinacea purpurea* extract increased Polymorphonuclear (PMN) phagocytic activity for 5 days that reached its peak levels at 5th day. Senchina *et al.* (2006) and studied that dried *Echinacea* roots retain cytokine-modulating capabilities in an in vitro human older adult model of influenza vaccination (Senchina *et al.*, 2006). *Echinacea* had an enhancing effect on efficiency of influenza vaccine (Najafzadeh *et al.*, 2011).

CONCLUSION

In conclusion, Artemisia extract and Echinacea extract has antitussive effect, although it is needed to evaluate their effective compound. It is suggested that their antitussive effect examined by other cough models.

ACKNOWLEDGMENT

The authors wish to express their gratitude to the research council of Shahid Chamran University for their financial supports.

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