



## Echium Amoenum Fisch. Et Mey: A Review on its Pharmacological and Medicinal Properties

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**ABSTRACT:** Echium amoenum, famous as Borage, belongs to Boraginaceae family. It grows widely in most of Europe, Mediterranean region and also found in northern parts of Iran. It is one of the famous plants in Iranian traditional medicine for different kind of effects such as demulcent, anti-inflammatory, analgesic, anxiolytic and sedative properties. The main medicinal parts of the plant are flowers and the leaves. The plant consists of gamma-linolenic acid (GLA), alpha-linolenic acid (ALA), delta6-fatty acyl desaturase, delta8-sphingolipid desaturase, pyrrolizidine alkaloids, and mucilage, resin, potassium nitrate, calcium and mineral acids. This review focuses on pharmacological properties of Echium amoenum as antibacterial, antioxidants, analgesic, anxiolytic, antidepressant, immunomodulatory, protective effects on pancreatitis and antiviral agents.

**Key words:** Echium Amoenum, Boraginaceae, Family anti-inflammatory

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### INTRODUCTION

Echium amoenum, famous as Borage, is from Boraginaceae family which has a large hairy annual herb (Hooper, 1937). It is distributed in most of Europe, Mediterranean region and also found in northern parts of Iran. It has bright blue flower and fruit comprise of four brownish-black nutlets. Borage grows up in ordinary soil and can be propagated by cuttings of shoots and also from seeds; it grows at an altitude ranging from 60 to 2200m (Soltani, 2005). The main medicinal parts of the plant are flowers and the leaves which are employed as an antifebrile, antidepressant, poultice for inflammatory, swellings (Amin, 2004 ; Tonkaboni, 2007), diuretic, laxative and as probable protective factor against cancer (Aghili, 2009).

The plant consists of gamma-linolenic acid (GLA), alpha-linolenic acid (ALA), delta6-fatty acyl desaturase, delta8-sphingolipid desaturase, pyrrolizidine alkaloids, mucilage, resin, potassium nitrate, calcium and mineral acids (Mehrabani et al., 2005; Ghassemi et al., 2003; Mehrabani et al., 2006). It is one of the famous plants in Iranian traditional medicine (Hooper, 1973). E. amoenum is well known for different kind of effect such as demulcent, anti-inflammatory, analgesic, anxiolytic and sedative properties in folk medicine of Iran (Hooper, 1937; Soltani, 2005).

### PHARMACOLOGICAL PROPERTIES

#### 1. Antibacterial properties

Extract of E. amoenum had concentration-dependent activity against Staphylococcus aureus. Antibacterial activity showed heat resistant and the freeze-dried extract activity gradually reduced in a 90-day. It is believed that borage flower can be used for controlling infectious and fever (Abolhassani, 2004)

#### 2. Antioxidants properties

A cross-sectional clinical trial was carried out to evaluate the antioxidant properties of E. amoenum flower. E. amoenum (7 mg/kg) was used in a group of 38 healthy subjects twice daily for 14 days. Lipid peroxidation level (LPO), total antioxidant capacity (TAC) and total thiol (SH) molecules were measured in subjects before and after extract administration. A significant reduction of blood LPO was seen after 14 days of E. amoenum consumption. Blood TAC and total thiol molecules increased after 14 days of E. amoenum consumption (Ranjbar et al., 2006)

#### 3. Analgesic properties

Formalin and hot-plate test were employed to evaluate analgesic effects of E. amoenum on male albino mice. Different doses 5, 10, 20 and 30 mg/kg were

employed and the results proposed that the dose of 10 mg/kg of extract had the highest analgesic effects than the control group. However analgesic effect of extract was lower in compare with morphine 2.5 mg/kg and ASA 300 mg/kg. Interestingly pretreatment of animal with naloxone before extract injection, decreased the analgesic effect of extract in hot-plate and acute phase of formalin tests; so, it was proposed that opioid receptors are involved in the analgesic effect of *E. amoenum* extract (Heidari et al., 2006).

#### 4. Anxiolytic and antidepressant activities

One study showed that the hydro alcoholic extract of *E. amoenum* at the dose range of 125, 250 and 500 mg/kg had no significant effect on motor activity however the aqueous extract (62.5, 125, 250 and 500 mg/kg) decreased motor coordination significantly. Injection of aqueous extract increase time spent in open arm (OAT) in a dose dependent manner with no significant change in open arm entries (OAE), closed arm entries (CAE) and total arm entries (TAE), and extract at the dose of 125 mg/kg had the highest anxiolytic properties, however no change in motor activity was observable in this dose (Rabbani et al., 2004, 2011; S. Andalib, 2011).

In other study the aqueous extract of this plant was used at the dose of 125 mg/kg during two different courses, 15 and 30 days. A sample size of 36 rats in 6 groups was selected for this experiment. After finishing these courses the results suggested that in 30-day treatment course, time spent in open arms was higher in compare to of 15-day treatment (Shafaghi et al., 2002).

*E. amoenum* was used in 35 patients randomly with daily dose of 375 mg of in a 6-week double blind, parallel-group trial. Patients were evaluated in weeks 0, 1, 2, 4 and 6 with the Hamilton Rating Scale for depression, anxiety and a score sheet for adverse effects. In week 4 results showed, the extract had a significant superiority in reducing depressive symptoms compare to placebo. However the anxiolytic effect was not significant. The most commonly reported side effects were headache and vomiting ( Sayyah et al., 2006). In one other study forty-four patients were assigned to receive *E. amoenum* aqueous extract (500 mg/day) or placebo, double blind, parallel-group trial. Patients were assessed before and during study in 1, 2, 4, and 6 by the Yale-Brown obsessive compulsive, the Hamilton Rating Scale for anxiety and a score sheet on adverse effects. In weeks 4 and 6, the extract showed a significant effect in compare to placebo in reducing obsessive and compulsive and anxiety symptoms. Interestingly no differences were observed between the two groups in terms of adverse effects (Sayyah et al., 2009)

#### 5. Immunomodulatory properties

Aqueous and alcoholic extracts of *Echium amoenum* were used for treatment of *L. major* infection in

mice. Both extracts showed immune modulatory properties and the level of IFN- $\gamma$  increased, parasite burden decreased in the proximal lymph nodes and was prevented from the necrosis of the footpad as compared with the untreated infected mice (Amirghofran et al., 2000)

#### 6. Protective effects on pancreatitis

The protective effect of *E. amoenum* extract (EAE) on a pancreatitis has been evaluated. Acute pancreatitis was induced by intra peritoneal (i.p.) injection of cerulean which increased serum digestive enzymes level, in comparison to normal mice. The extract was injected 30 minutes before induction of pancreatitis. Pretreatment with extract (400 mg/kg) reduced the inflammatory response of acute pancreatitis which ameliorated pancreatic edema, amylase and lipase serum levels (Abed et al., 2012)

#### 7. Antiviral properties

Aqueous extract of borage flowers has shown antiviral and antifebrile activity in vitro. It was used against, *Staphylococcus aureus*, which showed concentration-dependent activity. Also antiviral activity of the extract was heat resistant. These studies showed promising effects of extract for infectious disease (Abolhassani, 2010).

#### 8. Toxicity

*Echium amoenum* is frequently used in many conditions such as an immune stimulant pain, sore throat and arthritis. However toxicological studies have not confirmed its safety, for example it has been shown that both aqueous and hydro alcoholic extract were genotoxic in the concentrations of 25 mg/ml (Etebari et al., 2012).

### DISCUSSION

In conclusion, this review has focused on some of pharmacological property of *Echium amoenum* as antibacterial (borage flower can be used for controlling infectious and fever), antioxidant, Analgesic (opioid receptors are involved in the analgesic effect of *E. amoenum* extract), Anxiolytic and antidepressant (the extract showed a significant effect in compare to placebo in reducing obsessive, compulsive and anxiety symptoms), Immunomodulatory, pancreatitis protective and Antiviral agents. It is required to determine its effective substances and their mechanisms of action or possible toxicities in the future.

#### Conflict of Interests

The authors declare that they have no conflict of interests.

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