

Anticonvulsant Effects of *Coriandrum Sativum* L. Seed Extracts in Mice

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• Abstract

Background—Coriander (vernacular Geshniz) seeds have been traditionally used in Iranian medicine for their carminative, diuretic and anticonvulsant effects.

Objective—The anticonvulsant effects of the aqueous and ethanolic extracts of *Coriandrum sativum* seeds were studied in mice in order to evaluate the folkloric use of this plant.

Methods—Two anticonvulsant evaluation tests, namely the pentylenetetrazole (PTZ) and the maximal electroshock tests, were used for assessing antiseizure effects.

Results—In the pentylenetetrazole test, the aqueous and ethanolic extracts prolonged the onset of clonic convulsions and the anticonvulsant activity of high dose extracts (5 mg/kg) were similar to that of phenobarbital at a dose of 20 mg/kg in the PTZ test. Both extracts in high doses decreased the duration of tonic seizures and showed a statistically significant anticonvulsant activity in the maximal electroshock test.

Conclusion—Results indicate that the aqueous and ethanolic extracts of *C. sativum* seeds may have a beneficial effect in petit mal and grand mal seizures.

Keywords • *Coriandrum sativum* • coriander • anticonvulsant activity • medicinal plants • pentylenetetrazole test

Introduction

Coriandrum sativum, which is called Geshniz in Iran, has been reported to have several pharmacological effects such as antifertility¹, antihyperglycemic^{2,3}, antihyperlipidemic^{4,5,6}, antioxidant⁴, antiproliferative⁷ and hypotensive activities⁸. Chemical studies on *C. sativum* have shown the presence of constituents such as quercetin 3-glucuronide⁹ linalool, camphor, geranyl acetate, geraniol¹⁰ and coumarins¹¹.

This plant is furthermore, believed to have carminative, diuretic and anticonvulsant¹² effects. The aim of this study was to investigate the anticonvulsant effect of coriandrum seed extracts on the maximal electric seizures and pentylenetetrazole tests.

Material and Methods

Animals

Male and female albino mice weighing 25-30 g were obtained from a random-bred colony of mice which were maintained on a special diet (Khorassan Javane Co., Mashhad, Iran) in the animal house of Mashhad University of Medical Sciences. The animals were housed in colony rooms with 12/12 h light/dark cycle at $21 \pm 2^\circ$ C and had free access to food and water.

Plant material

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Seeds were collected from an area near the city of Abadan (southern Iran) in May 1998, dried in the shadow, and subsequently grounded. *C. sativum* L. was properly identified by Ferdowsi University (MS Safavy) and voucher samples were preserved for reference in the herbarium of Ferdowsi Herbarium, Mashhad, Iran (1872).

Preparation of extracts

A decoction extract was prepared to comply with the form usually used in folk medicine. Since there is possibility of decomposition of the active components in hot water, a maceration extract was also prepared. In the decoction method, one liter of hot water was added to the seeds (100 g), boiled for 15 minutes, and then filtered through cloth. The extract was then concentrated under reduced pressure to the desired volume (yield 8.33%). In the maceration method, powdered seeds (200 g) were macerated in 500 ml ethanol (70%, v/v) for three days. This mixture was filtered and concentrated under reduced pressure at 50° C (yield: 4.5%) and then suspended by propylene glycol. In the preliminary experiment, propylene glycol (used for suspension of the ethanolic extract) did not show any anticonvulsant effect in low doses.

Anticonvulsant activity:

Pentylentetrazole (PTZ) seizure test

The aqueous and ethanolic extracts as well as phenobarbital were all injected intraperitoneally (i.p) 30, 40 and 45 minutes before administration of pentylentetrazole (i.p., 90 mg/kg). The time taken before onset of clonic convulsions and percentage mortality was also recorded.

Maximal electroshock test

An alternating current stimulus of 50 Hz and 150 mA through bicornal electrodes was delivered for 0.2 s to the experimental animals. A drop of 0.9% saline solution was poured into each eye prior to placing the electrodes. Duration of tonic convulsion (a tonic extension of the hind-limb) and percentage of mortality were recorded.

Maximum tolerated dose

Different doses of the extracts were injected intraperitoneally into the separated groups of four. After 24 hours, the highest dose that failed to induce any mortality was considered as the maximum tolerated dose.

Acute toxicity

Different doses of extracts were injected intraperitoneally into the separated groups of six mice. The number of deaths was counted at 48 hours after treatment and the LD50 values were calculated by the logit method.

Statistical analysis

Data were expressed as mean values \pm SEM and tested with variance analysis followed by the multiple comparison test of Tukey-Kramer.

Results

The maximum non-fatal dose of the decoction and maceration extracts was 0.5 g/kg and 5 g/kg, and the LD50 values of the decoction and maceration extracts were 0.78 g/kg and 8.11 g/kg, respectively.

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Intraperitoneal injection of both extracts increased the latency of the convulsions induced by PTZ according to dose, but failed to produce complete protection against mortality. The anticonvulsant activities of high dose extracts were similar to that of phenobarbital at a dose of 20 mg/kg in the PTZ test ([Table 1](#)).

In the maximal electroshock seizures, the aqueous extracts of seeds (at a dose of 0.5 g/kg) and the ethanolic extract (at doses of 3.5 and 5 g/kg) decreased the duration of tonic seizures by 22.30%, 30.43% and 36.96%, respectively ([Table 2](#)).

Discussion

The present results indicate that the aqueous and ethanolic seed extracts of *C. sativum* have anticonvulsant activity in the PTZ and maximal electroshock tests. In respect to the LD50 values, the aqueous extract was more toxic than the ethanolic extract. The reason for this higher toxicity is not clear and needs further investigation.

Compared with a toxicity classification¹³, the ethanolic and aqueous extracts were mildly and moderately toxic, respectively. The aqueous leaf extract and ethanolic seed extract increased the latency of convulsion induced by PTZ by about 3-5 minutes, which was comparable to phenobarbital. Agents affecting on the PTZ test can inhibit petit-mal seizure¹⁴. Thus *C. sativum* seed extracts may have activity on this kind of seizure. Both aqueous and ethanolic extracts showed activity against maximal electroshock seizures. This implies that the extracts have efficacy in grand mal seizure¹⁴.

The mechanism of the anticonvulsant effect of *C. sativum* is not clear. Anticonvulsant activity has been reported for coumarin compounds¹⁵, isolated from *C. sativum*¹¹. Further investigation is required in order to clarify the anticonvulsant mechanism of this plant. It is concluded that the aqueous and ethanolic extracts of *C. sativum* may show anticonvulsant activity against petit mal as well as grand mal seizures.

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