

Evaluation of Antidiarrhoeal and Neuropharmacological Activity of *Cynanchum acutum* in Rat

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Abstract: *Cynanchum acutum* is used in Iranian traditional medicine as an agent for treatment of some diseases and troubles. In this present study, effects of *Cynanchum acutum* on rat for its neuropharmacological and antidiarrhoeal activity were evaluated. One hundred and fifty mg/kg/day of *Cynanchum acutum* as treatment was given to 10-week old wistar rats and neuropharmacological and antidiarrhoeal properties of that were evaluated. The extract of *Cynanchum acutum* potentiated the pentobarbital induced sleeping time in rats and decreased the open field score in open field test, decreased the number of hole crossed from 1 chamber in the hole cross test and decreased the head dip responses in hole board test. It can be conclude that *Cynanchum acutum* has neuropharmacological and antidiarrhoeal effects in rats.

Keywords: Antidiarrhoeal, *Cynanchum acutum*, Neuropharmacologica

INTRODUCTION

Cynanchum acutum is an invasive plant species belonging to the family Apocynaceae. The photochemical investigations on *Cynanchum acutum* L. have revealed the presence of several natural compounds including β -sitosterol, lupeol, lupyl acetate and α -amyrin (Halim *et al.*, 1990), sarcostine, quercetin and quercetin 3-O- β -D-galactoside (El-Sayed *et al.*, 1994), four flavonoid glycosides: quercetin di-O-hexoside, quercetin 3-O-rhamnosyl (1 \rightarrow 2) glycoside, quercetin 3-O-galactoside and quercetin 3-O-xyloside (Heneidak *et al.*, 2006) and 2 simple coumarins: scopoletin and scoparone (El-Demerdash *et al.*, 2009) as well as of 7 other flavonoids (Ghada *et al.*, 2008). Studies on other species of this genus which have close affiliations with *C. acutum* also have been done and the following products have been distinguished: steroidal glycosides (Liu *et al.*, 2007), carbohydrates (Yi-Bin *et al.*, 2004), alkaloids (Tian-Ying *et al.*, 2001), phenolic compounds (Lou *et al.*, 1993) and triterpenes (Konda *et al.*, 1990). This close affiliation enables us to predict the presence of these products in *C. acutum*, since close genotypes ends to production of similar compounds.

Antidiabetic and antioxidant activity of metanolic extract of aerial parts of *Cynanchum acutum* has been reported and antiulcerogenic effects of ethanolic extract of the plant also have been shown in rats (Atta *et al.*, 2005). In Iranian traditional medicine, *Cynanchum acutum* is used for its pharmaceutical characteristics.

Whereas, there are not any scientific reports about the neuropharmacological effects of *Cynanchum acutum*, the present study was done.

MATERIALS AND METHODS

Plant material: *Cynanchum acutum* was collected from Sistan and Balouchestan province and then was identified by a botanist. The whole plant at flowering time was dried under shade and powdered. The extract was prepared by the maceration method (80% ethanol in 300 g/L for 48 h), filtered with filter paper. After filtration ethanol was removed by rotary evaporator. The extract was dissolved in normal saline and administrated orally into rats.

Animals and treatment: Animals purchased from Razi Institute, (Karaj, Iran) and maintained according to the guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals, Razi Institute, Karaj, Iran. The animals were provided with standard laboratory food and tap water ad libitum and maintained at natural day night cycle. All the experiments were conducted on an isolated and noiseless condition.

Evaluation of neuropharmacological activity:

- **Pentobarbital induced hypnosis:** For testing pentobarbital induced hypnosis the animals were divided into 2 groups consisting of 7 rats/each group. Group I was the control group and group II

was the experimental groups. The experimental group was administered with the 150 mg/kg of body weight ethanolic extract of *Cynancum acutum* (i.p.), while the animals of group I were supplied with normal saline (i.p.) at the dose of 10 mL/kg of body weight. The total sleeping time were recorded for both controls as well as for treated groups.

- **Exploratory behavior:** This experiment was fulfilled by:
 - Open field test
 - Hole cross test
 - Hole board test

The test animals were divided into two groups consisting of seven rats in each group. Group I was the control group and group II was the experimental groups. The experimental group was treated with the ethanolic extract of *Cynancum acutum* at dose of 150 mg/kg of body weight (i.p.), while the animals of group I (control) were supplied normal saline (i.p.) at the dose of 10 mL/kg of body weight. The observations were made on 0 min before injection and 30, 60, 120 and 240 min after injections of the test samples and control.

Statistical analysis: Data were expressed as mean±standard deviation. Student's t-test was used to compare means. A level of $p < 0.05$ was considered as statistically significant.

RESULTS

Table 1 indicated the effect of *Cynancum acutum* extract on pentobarbital induced hypnosis in rats. The total sleeping time between 2 groups was significantly difference and it was about 70 min at dose of 150 mg/kg of body weight in experimental group, whereas in control group it was about 35 min. Table 2 shows results about test for exploratory behavior in rat which was performed by:

- Open field test
- Hole cross test
- Hole board test

Our data showed that the extract decreased the number of open field score, caused decrease in the number of

Table 1: Effect of ethanolic extract of *Cynancum acutum* (150 mg/kg of body weight) on pentobarbital induced hypnosis in rat

Animal group	Time of onset of sleep (min)	Total sleeping time (min)
Group I (control)	8.365±0.134	35.76±3.61
Group II (experimental)	7.247±0.043*	70.43±1.52**

Values are Mean±SEM; *: $p < 0.05$; **: $p < 0.001$ vs. control

hole crossed from one chamber to another chamber and also decreased head dip responses in rats.

DISCUSSION

Central depressants elicit their effect by interfering with the functions of the cerebral cortex. A most important method of investigating the probable cortical manifestation of a drug is to check its effect on the pentobarbital narcosis as pentobarbital has multifarious effects on the cerebral cortex. The pentobarbital sleeping time test was performed to find out whether the extract of the plants have any effect on the cerebral cortex. Pentobarbital shorten the onset of sleep and increases sleep duration. The ethanolic extract of *Salvia hypoleuca* reduced the onset of sleep and potentiated the pentobarbital induced sleeping time in rats, which suggests its central depressant activity (Perez *et al.*, 1998), thus, suggesting the probable tranquilizing action. It has been experimentally proven that, in the absence of a special task to perform, the behavior of a given animal tend to maintain that inner activation level that is, at times, inconsistent with the actual level of activation of the animals. In order to get as accurate a picture as possible, on the effect of the drug on exploration, the open field test was performed. The extract also made rats to reduce their behavioral exploration, which further support the central sedative properties of the extract. The overall results tend to predict the CNS depressant action of the extract. In conclusion, it could be suggested that the ethanolic extract of *Cynancum acutum* has central nervous system depressant activities. However, further studies comprising of thorough phytochemical investigations of the used plant to find out the active principles and evaluation for these activities using other models are essential confirm its pharmacological properties.

Table 2: Effect of ethanolic extract of *Salvia hypoleuca* (150 mg/kg of body weight) on exploratory behavior in rats

Groups	0 min	30 min	60 min	120 min	240 min
Effect on open field test					
Control	82.17±1.08	90.64±0.74	94.46±0.84	103.14±0.23	104.83±0.46
Experimental	82.74±0.65*	76.65±1.09*	69.43±1.76*	61.56±1.98*	59.76±2.09*
Effect on hole cross test					
Control	7.20±0.63	8.67±0.37	8.98±0.76	9.23±0.69	9.34±0.71
Experimental	6.30±0.79*	5.97±0.42*	4.02±0.12*	3.27±0.31*	3.00±0.11*
Effect on hole board test					
Control	13.21±0.64	21.15±1.05	21.79±1.01	16.02±0.74	12.58±0.56
Experimental	11.66±0.87*	10.12±0.76*	9.52±0.91*	7.31±0.87*	5.43±0.85*

Values are Mean±SEM; *: $p < 0.05$; **: $p < 0.001$ vs. control

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