

**NEUROPHARMACOLOGICAL AND ANTIDIARRHOEAL ACTIVITY OF ETHANOLIC
EXTRACT OF SALVIA HYPOLEUCA IN RAT**

Nasim Javdan, Jasem Estakhr

Science and Research Branch, Islamic Azad University, Fars, Iran.

Corresponding Address: Nasim Javdan, n_j222222@yahoo.com Tel: +989153400715.

Summary

Salvia hypoleuca is used in Iranian traditional medicine as an agent for treatment of some diseases and troubles. In this present study, effects of Salvia hypoleuca on rat for its neuropharmacological and antidiarrhoeal activity were evaluated. One hundred and fifty mg/kg/day of S. hypoleuca as treatment was given to 10-week old wistar rats and neuropharmacological and antidiarrhoeal properties of that were evaluated. The extract of Salvia hypoleuca 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 one chamber in the hole cross test and decreased the head dip responses in hole board test. It can be conclude that Salvia hypoleuca has neuropharmacological and antidiarrhoeal effects in rats.

Keywords: Neuropharmacologica, Antidiarrhoeal, Salvia hypoleuca.

Introduction

The genus *Salvia*, one of the most important genres of Lamiaceae family, is widely used in flavouring and folk medicine all around the world (1). Fifty-eight species of this genus are documented in the Flora of Iran; 17 of them are endemic (2). The plants of the genus *Salvia*, which consist about 900 species (3) are generally known for their multiple pharmacological effects such as analgesic and anti-inflammatory (4), antioxidant (5), hepatoprotective (6), hypoglycemic activities (7), and antiischemia (8,9). In Iranian traditional medicine, *Salvia hypoleuca* is used for its pharmaceutical characteristics. Whereas, there are not any scientific reports about the neuropharmacological effects of *Salvia hypoleuca*, the present study was done.

Materials and Methods

Plant material

The plant was collected from Guilan province (Iran), and authenticated at Medicinal Plants & Drugs Research Institute, Shahid-Beheshti University, Tehran, Iran. Its leaves and fruits were dried, under shade and powdered. The extract was prepared by maceration method (80% ethanol in 300 g/l for 48 h), and was filtered with a filter paper. Ethanol was removed by a 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

i) Pentobarbital induced hypnosis

For testing pentobarbital induced hypnosis (according to method Williamson et al. (10)) the animals were divided into two groups consisting of seven rats per 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 *Salvia hypoleuca* (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.

ii) Exploratory behavior

This experiment was fulfilled by (i) Open field test (ii) Hole cross test and (iii) 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 *Salvia hypoleuca* 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 \pm 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 *Salvia hypoleuca extract* on pentobarbital induced hypnosis in rats. The total sleeping time between two 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 (i) Open field test (ii) Hole cross test and (iii) Hole board test. Our data showed that the extract decreased the number of open field score, caused decrease in the number of hole crossed from one chamber to another chamber, and also decreased head dip responses in rats.

Table 1: Effect of ethanolic extract of *Salvia hypoleuca* (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.

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 (11), thus, suggesting the probable tranquilizing action. It has been

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	84.17±1.08	91.64±0.74	95.46±0.84	104.14±0.23	105.83±0.46
Experimental	83.74±0.65*	77.65±1.09*	70.43±1.76*	62.56±1.98*	60.76±2.09*
Effect on hole cross test					
Control	7.49±0.63	8.98±0.37	9.05±0.76	9.48±0.69	9.54±0.71
Experimental	6.37±0.79*	6.05±0.42*	4.14±0.12*	3.57±0.31*	3.01±0.11*
Effect on hole board test					
Control	14.32±0.64	20.15±1.05	21.89±1.01	17.03±0.74	13.98±0.56
Experimental	12.96±0.87*	11.02±0.76*	10.63±0.91*	8.71±0.87*	6.54±0.85*

Values are Mean ± SEM; *, $P < 0.05$; **, $P < 0.001$ vs. control.

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 *Salvia hypoleuca* 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.

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