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In-vivo neurological assessment of sedative hypnotic effect of *Coriandrum sativum* L. seeds in mice.

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Abstract

Ethnopharmacological relevance: seeds of *Coriandrum sativum* L. have been used in the traditional medicine to relieve stress and other neurological disease conditions.
Aim of the study: The present study was under taken to evaluate the sedative hypnotic response of ethanolic extract of seeds of *Coriandrum sativum* L. (CSEE) in mice.
Materials and methods: seeds of *Coriandrum sativum* L. Ethanolic extract was screened for sedative hypnotic response by using potentiation of Pentobarbital sleeping time at doses of 100mg/kg, 150mg/kg and 200 mg/kg. Saline and Pentobarbital sodium were employed as negative and positive control groups, respectively.
Results: Ethanol extract increases Pentobarbital sodium induced sleeping time at dose of 100 mg/kg, 150 mg/kg and 200 mg/kg by 106 %, 111 % and 114% respectively as compared to negative control group and by 06 %, 11% & 14% respectively as compared to positive control group
Conclusion: from present study finding it is found that seeds of *Coriandrum sativum* L. potentiate the sedative hypnotic efficacy in mice.
KEYWORDS: Sedative, Hypnotic, Pentobarbital sodium, *Coriandrum sativum* L.

Introduction

A wide variety of chemical classes can have relatively similar effects in inducing sleep is an intriguing pharmacologic question. Probably the dominant theory—that these compounds exert their actions by altering the physical properties of lipids in neuronal membranes—comes from the alcohol and anesthetic literature [1]. Although there are many viewpoints about which specific aspect of lipid properties is affected (i.e., fluidity, thickness, or surface tension), it is largely a physicochemical approach. Ultimately, it was found inadequate for a number of reasons; perhaps the most important is that there are very little or no detectable changes in lipid bilayers at the concentrations at which these compounds induce sleep or anesthesia [1]. Ultimately, interest has turned to more specific mechanisms; by far the most satisfying one (and the focus of this chapter) is the notion that altering neurotransmitter gated receptor channels induces sleep and anesthesia [2]. Another approach to understanding sedative/hypnotics has been to hypothesize that sleep results from drug-induced reduction in energy metabolism; barbiturates, for instance, decrease cerebral glucose metabolic rate in human positron emission tomography (PET) scan studies [3]. On the other hand, the results of animal studies have been more variable, such that barbiturates may [4] and benzodiazepines may not [5] decrease cerebral metabolic rate of oxygen (CMRO2). A more cogent argument against the notion that hypnotics induce sleep by lowering metabolic rate is that it stems from a view of sleep as being a very passive process, which seems to contradict the more contemporary understanding of sleep as a multifaceted, actively regulated process [6]. Indeed, at doses that induce sleep (and prior to achieving anesthetic doses), patients receiving most hypnotic medications demonstrate the alternating ultradian rhythm of NREM and REM sleep, which indicates an active regulatory mechanism. It seems more parsimonious, then, to hypothesize that sedative/hypnotics act at specific sites involved in sleep regulation, rather than producing a nonspecific "slowing" of the nervous system. Coriander (*Coriandrum sativum* L.), a member of the family Apiaceae, is among most widely used medicinal plant, possessing nutritional as well as medicinal properties. In our previous study findings seeds of *Coriandrum sativum* L. evaluated for analgesic (hot plate method), antidepressant (forced swim test), anxiolytic like activity (elevated plus maze, locomotor test, Rota rod test, Open field test and Hole board test) on mice, which shows significant effects [7-9].

In present study *Coriandrum sativum* L. seeds extract was assessed for sedative hypnotic efficacy on albino mice.

Materials and Methods

Experimental Animals

Swiss albino mice of male sex weighing 22–28 g were used. Animals were maintained under standard conditions in an animal house approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). Institutional Animal Ethics Committee approved the experimental protocol. The animals were given standard diet. The animals had free access of standard diet and water and housed in a spacious cage for one week. Mice were housed in cages of 5 at 22 ± 1◦C in a 12- h light/dark cycle. Tap water and food pellets were available as libitum. Groups of 6–11mice were randomly assigned to different treatment groups and were tested in a counter balancing order. Animals were naive to experiment conditions. All experiments were carried out during night cycle of light and the experiments were carried out according to the National Research Council Guide for the Care and Use of Laboratory Animals. All experiments were conducted in accordance with international standards of animal welfare recommended by the Society for Neuroscience [10]. The experimental protocol was approved by the Bioethical Committee on Animal Research. The minimum number of animals and duration of observations required to obtain consistent data were employed.

Drugs and Chemicals

The positive controls were: Pentobarbital sodium (Nembutal, Oak Pharmaceuticals, Inc.) Ethanol (Hi Media, India) was purchased from the respective sources and was of analytical grade.

Treatment

The extract of *Coriandrum sativum* L. was freshly dissolved in distilled water to be acutely administered to the rats. Doses of the extract and the time intervals were determined in preliminary tests. Pentobarbitone (50 mg/kg) was dissolved in distilled water. Negative control groups received only distilled water. All administrations were performed intraperitoneally in a dose volume of 1 ml/kg body weight. Thirty minutes after intraperitoneally treatment, the animals were submitted to a battery of behavioral tests.

Source of Coriander Seeds

Dried seeds of coriander were purchased from local market and the identity of the seed was confirmed by the Institutional Botanist. A voucher specimen was kept in laboratory for future reference.

Preparation of Aqueous Extract

Dried coriander seeds were homogenized to a fine powder. Hundred grams of powdered coriander was Infused in 500 ml cold ethanol for 24 h, brought to the boil, then removed from the heat source and allowed to infuse for 15 min. The extract was filtered, concentrated over the water bath and brought to dryness under vacuum. The yield of the extract was 7.9% (w/w).

Acute toxicity study

Acute toxicity study was performed using the limit test dose of 2000 mg/kg as described by Organization for Economic Cooperation and Development guideline and Interagency Research Animal Committee recommendation [11]. Six female mice were dosed sequentially and followed for any signs of toxicity and/ or death within 24 h and then for 14 days thereafter.

Potentiation of Pentobarbital Sleeping Time

The ethanolic extract was prepared to be administrated intraperitoneally at dose levels of 100 mg/kg, 150 mg/kg and 200 mg/kg. Extracts were administered half an hour before administration of Pentobarbital sodium (50 mg/kg). The onset of action was noted and also the duration of action i.e. the time when the mice regains righting reflex. Each mice was so kept that they were not disturbed by the adjacent mice [12].
Group I: Treatment with Pentobarbital Sodium (50 mg/kg)
Group II: Treatment with Ethanolic Extract (100 mg/kg) followed by Pentobarbital Sodium (50 mg/kg) after 30 min.
Group III: Treatment with Ethanolic Extract (150 mg/kg) followed by Pentobarbital Sodium (50 mg/kg) after 30 min.
Group IV: Treatment with Ethanolic Extract (200 mg/kg) followed by Pentobarbital Sodium (50 mg/kg) after 30 min.

Statistical Analysis

The statistical significance was assessed using one way analysis of variance (ANOVA) followed by Dunnet comparison test. The values are expressed as mean ± SEM and $p<0.05$ was considered significant.

Result

Acute toxicity test

At a single oral dose of 2000 mg/kg, seeds of *Coriandrum sativum* L. Ethanol Extract showed no signs of toxicity or death in mice within the first 24 h and during the 14 days observation period.

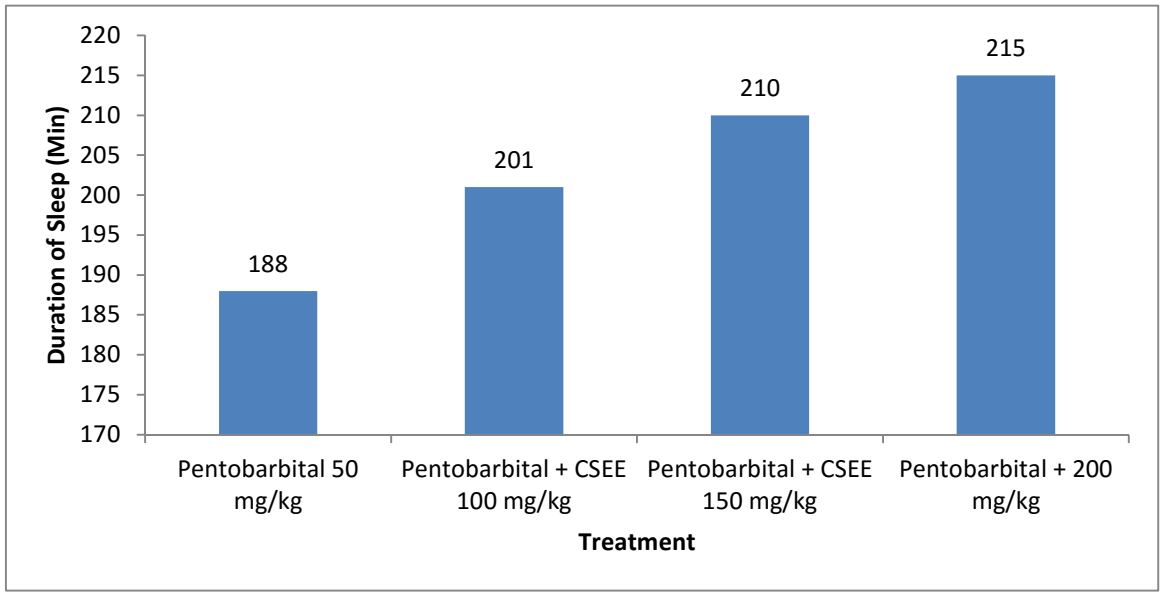
Potentiation of Pentobarbital Sleeping Time

Ethanol extract of seeds of *Coriandrum sativum* L. produce dose dependent increase in Pentobarbital sodium induced sleeping time. Ethanol extract increases Pentobarbital sodium induced sleeping time at dose of 100 mg/kg, 150 mg/kg and 200 mg/kg by 106 %, 111 % and 114% respectively as compared to negative control group and by 06 %, 11% & 14% respectively as compared to positive control group (Table 01 & Figure 01).

Table 01: **Potentiation of Pentobarbital Sleeping Time**

Group	Dose	Onset of Action (Min)	Duration of Sleep / Recovery Time (Min)
Negative Control (Saline)	01 ml/kg	Nil	Nil
Positive Control (Pentobarbital Sodium)	50 mg/kg	6.54	188
Test 1 Pentobarbital 50 mg/kg + CSEE 100 mg/kg	100	6.41	201
Test 1 Pentobarbital 50 mg/kg + CSEE 150 mg/kg	150	6.23	210
Test 2 Pentobarbital 50 mg/kg + CSEE 200 mg/kg	200	6.01	215

Figure 01: **Potentiation of Pentobarbital Sleeping Time**



Discussion

Our pervious study indicates the seeds of *Coriandrum sativum* L. decreases locomotion and Neuromuscular coordination hence possess significant antidepressant and anxiolytic effect. ethanol extract of *Coriandrum sativum* L. seeds was found to be significant as compared to methanol and aqueous extract, therefore present study was held to investigate sedative hypnotic efficacy of ethanol extract of *Coriandrum sativum* L. seeds.

Pentobarbital sodium is a short-to-intermediate acting barbiturate that exerts its pharmacological effect on the central nervous system by enhancing inhibition of GABA-mediated neurotransmission. the potentiation of pentobarbital sodium induced sleeping time was used to evaluate the possible sedative-hypnotic effect of *Coriander sativum* L. Seeds. Barbiturates act by binding to the barbiturate receptor in the GABA a receptor, distinct from that of GABA and benzodiazepine receptors and enhancing the inhibitory neurotransmission. In contrast to benzodiazepines, barbiturates cause increased duration of chloride channel opening. They also have a direct stimulatory effect on GABA receptors by acting as a GABA agonist and causing inhibitory action directly.

Conclusion

The present study was investigated the putative behavioral effects of the seeds of *Coriandrum sativum* L. ethanolic extract. The results of this study established a support to sedative hypnotic efficacy of seeds of *Coriandrum sativum* L.

References

[1]. Franks NP, Lieb WR. What is the molecular nature of general anaesthetic target sites [Abstract] TIPS 1987;8:169–174.

[2]. Franks NP, Lieb WR. Which molecular targets are most relevant to general anaesthesia to general anaesthesia [Abstract] Toxicol Lett 1998;Nov. 23: 100–101

[3]. Theodore WH, DiChiro G, Margolin R, et al. Barbiturates re- duce human cerebral glucose metabolism [Abstract]. Neurology 1986;36:60–64.

[4]. Nemoto EM, Klementavicius R, Melick JA, et al. Suppression of cerebral metabolic rate for oxygen (CMR02) by mild hypothermia compared to thiopental [Abstract]. J Neurosurg Anesthesiol 1996;8:52–59.

[5]. Carlsson C, Chapman AG. The effect of diazepam on the cerebral metabolic state in rats and its interaction with nitrous oxide [Ab- stract]. Anesthesiology 1981;54:488–4 6. Mendelson WB. Human sleep: research and clinical care. New York: Plenum Press, 1987.

[6]. Aslam Pathan, Nadeem L. Anxiolytic and analgesic effect of seeds of *Coriandrum sativum* Linn. Int J of Research in Pharm and Chem 2011; 1(4): 1087-1099.

[7]. Aslam Pathan, Abdulrahman Alshahrani, Feras Al-Marshad. Neurological assessment of seeds of *Coriandrum sativum* L. by using antidepressant and anxiolytic like activity on albino mice, Inventi Impact: Ethnopharmacology, 2015(3):102-105.

[8]. Aslam Pathan, Abdulrahman Alshahrani, In vivo neurological assessment of serotonergic response of *Coriandrum sativum* L seeds in mice, International Journal of Research in Pharmacology & Pharmacotherapeutics 2015; 4(4): 399-405.

[9]. Handbook for the Use of Animals in Neuroscience Research, 1997 (updated 18-July-97). http://apu.sfn.org/content/Publications/HandbookfortheUseofAnimalsinNeuroscienceResearch/Handbook.htm.

[10]. Organization of Economic Co-operation and Development (OECD). The OECD Guidelines for Testing of Chemical: 423 Acute Oral Toxicity, France, 2001

[11]. H Gerhard Vogel, Drug discovery and Evaluation- Pharmacological assays, Second edition, Springer Publication, Germany 2002; 495-496.