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Central nervous system depressant effect of two spices ajowan (*Carum copticum* Karst.) and bay leaves (*Cinnamomum tamala* T.Nees.)

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SUMMARY

Two common Indian spices *Carum copticum* Karst (ajowan) and *Cinnamomum tamala* T.Nees. (bay leaves) has been investigated first time to report the activity on the central nervous system. Preliminary study of the hot water extract showed depressant activity on the hole board test as evidenced from the ambulation and head dipping scores. The extracts further quicken the onset and increased the duration of pentobarbital induced sleeping time.

Key words: Ajowan; Bay leaves; CNS; Depressant; Spice; *Carum copticum*; *Cinnamomum tamala*

INTRODUCTION

The prolonged use of modern tranquilizers and psychotropic drugs leads to a variety of autonomic, endocrine, allergic, hematopoietic and neurological side effects. Moreover, such agents primarily relieve the symptoms and offer a palliative relief of a temporary nature (Koslow *et al.*, 1995). During the last two decades, pharmacotherapy with psychoactive drugs has been increasingly recognized as most effective in the management of anxiety, stress and psychosomatic disorders. In many countries herbal medicines (e.g., St John's Wort, Valerian) are as commonly prescribed as conventional medications for the treatment of psychiatric problems (Miller and Murray, 1998). The potential of plants as sources for new centrally acting drugs is still largely unexplored, only a small percentage have been investigated phytochemically, and the fraction submitted to biological or pharmacological screening is even smaller (Hamburger and Hostettmann, 1991).

Indian system of culinary and medicine has used spices towards the improvement of health and treatment of several ailments in humans for the last 5000 years (Baliga *et al.*, 2003). Ajowan (*Carum copticum* Karst.) and bay leaves (*Cinnamomum tamala* T. Nees.) are common spices used in Indian subcontinent and other Asian regions. The *Carum copticum* is a plant in the Umbelliferae family and is much used as a medical plant in Ayurvedic medicine (India) against diseases of the digestive tract and fever. The essential oil (2.5 to 5% in the dried fruits) is dominated by thymol (35 to 60%); furthermore, α-pinene, *p*-cymene, limonene and

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γ-terpinene have been found (Nadkarni, 1976; Lockwood, 2002). Recently analgesic, antitussive, antihypertensive, antispasmodic, bronchodilator and hepatoprotective activities of *Carum copticum* seed was reported (Boskabady *et al.*, 2005; Gilani *et al.*, 2005). *Cinnamomum tamala* T.Nees. is a moderate sized evergreen tree of the family Lauraceae. Indian bay leaves are of a tree closely related to cinnamon. Traditionally, leaves of *C. tamala* are used in colic and diarrhoeal preparations. In the essential oil from the leaves, mostly monoterpenoides were found: Linalool (50%) is the major compound, whereas α-pinene, *p*-cymene, β-pinene and limonene range around 5 to 10% each. (Nadkarni, 1976; Duke *et al.*, 2002). The essential oils of *Cinnamomum tamala* showed fungitoxic activity (Dubey *et al.*, 1998). Both the spices were reported as an antioxidant (Mehta *et al.*, 1994; Semwal *et al.*, 1999). The use of spices in daily life in Indian subcontinent encouraged us to preliminary evaluate the *in vivo* central nervous system depressant activity of ajowan and bay leaves using mice models.

MATERIALS AND METHODS

Plant materials and extract

The spices ajowan seeds (Carum copticum Karst.; Family: Umbelliferae) and bay leaves (Cinnamomum tamala T. Nees.; Family: Lauraceae) were collected from authenticated herbal shop in Dhaka, Bangladesh and identified by Mr. M. K. Miah of Bangladesh National Herbarium, where voucher specimens were preserved. The spices were then dried and finely powdered by a grinding machine (Mesh size #80). The hot water extract was prepared by boiling 100 g of the powdered plant materials in 1,600 ml water and was filtered and evaporated to give 400 ml of hot water extract.

Animals

Non-fasted mice (male, Swiss-webstar strain, 20 - 25 g body weight) bred in the animal house of the Department of Pharmacy, Jahangirnagar University, were used for the experiments. The animals were provided with standard laboratory food and tap water ad libitum and maintained at natural day night cycle. The animals were grouped (n = 6) according to body weight. The extract was administered orally at a dose of 10 ml/kg. The research was carried out according to the rules governing the use of laboratory animals as acceptable internationally.

Hole board test

This experiment was carried out by the method of (Alamgir *et al.*, 2002). Each animal was placed carefully in the center of the field and the number of holes passed, head dipping, and the number of fecal boluses excreted recorded for a period of two min at 0, 30, 60, 120 and 240 min interval after the oral administration of extracts.

Pentobarbital-induced sleeping time test

Pentobarbital sleeping time test was carried out by the method of (Williamson *et al.*, 1996). The extracts were administered per oral 30 min before the administration of pentobarbital (i.p.; 40 mg/ kg body weight). Diazepam (1 mg/kg i.p.) was used as a positive control. The animals were observed for the onset and the duration of sleep, as evidenced by the observation of the loss of righting reflex.

Phytochemical screening

The phytochemical tests for carbohydrates, alkaloids, saponins, glycosides, tannins, flavonoids were performed according to Ghani (1998).

Statistical analysis

Unpaired *t*-tests were performed by SPSS 9.05 to test the level of significance. Probability value of 0.05 or less ($P < 0.05$) was considered as significant. The data were expressed as a ratio of sleeping time mean value of experimental animals vs. control animals.

RESULTS AND DISCUSSION

Intact animals are considered the best method for investigating the action of drugs on central nervous system. Hole board test evokes a pattern of behavior characterized by exploration (head dipping through the holes), locomotion (ambulation past the holes), and emotional defecation. Decrease in sleeping latency and increase in sleeping time are classically related to central nervous system depressant drugs (Williamson *et al.*, 1996). As like many other centrally active drugs, barbiturates work on the cerebral cortex and thus produce their actions (Bowman and Rand, 1980). Pentobarbital, a barbiturate class hypnotic drug by an allosteric modification of $GABA_A$ receptor increases the chloride conductance and potentiates $GABA_A$ mediated postsynaptic inhibition (Katzung, 2001). The phytochemical study of the *Carum copticum* (ajowan) and *Cinnamomum tamala* (bay leaves) showed the presence of carbohydrate, saponins, tannins and flavonoids and absence of alkaloids and glycosides.

The hot water extract of *Carum copticum* (ajowan) and *Cinnamomum tamala* (bay leaves) have showed reduced ambulation of animals in the test and this was significant ($P < 0.01$) at 240 min compared to the control animals (Table 1). The exploratory head dipping behavior was more pronouncedly decreased from 30 min to 240 min ($P < 0.05$ – $P < 0.001$). Significant difference was not observed to the defecation compared to control. The findings in this experiment indicate possible central nervous system depressant activity of the *Carum copticum* and *Cinnamomum tamala* extract.

The extracts showed a non-significant decrease on the onset of the sleeping time (Table 2), but the duration of the pentobarbital induced sleeping time was significantly increased ($P < 0.05$). In comparison, depressant action of *Carum copticum* extract is better than the *Cinnamomum tamala* extract. The findings suggest the action may be attributed to the cerebral mechanism involved in the regulation of the sleep.

The results given in this paper are a preliminary evaluation of the plant and further activity

Table 2. Effect of ajowan and bay leaves on the hypnotic action of pentobarbital

Group	Onset of sleep	Duration of sleep
Control	353.8 ± 68.7	2519.1 ± 261.2
Ajowan	210.0 ± 13.4	4800.0 ± 427.6[a]
Bay leaves	270.0 ± 19.6	3802.5 ± 278.8
Diazepam (1mg/kg)	243.6 ± 16.2	5000.4 ± 139.8[b]

Values are expressed as Mean ± S.E.M (n=6) in min. [a] $P < 0.05$, [b] $P < 0.001$

Table 1. Effect of ajowan and bay leaves on hole board experiment

Group	0 min	30 min	60 min	120 min	240 min
Ambulation					
Control	23.25 ± 4.41	21.25 ± 3.67	16.75 ± 3.47	17.16 ± 3.20	19.91 ± 3.13
Ajowan	16.50 ± 5.11	16.00 ± 6.18	25.00 ± 5.57	9.83 ± 3.40	8.50 ± 2.86[b]
Bay leaves	18.16 ± 1.04	14.16 ± 2.35	21.00 ± 3.23	13.50 ± 1.23	9.16 ± 1.88[b]
Head Dipping					
Control	14.91 ± 0.98	11.58 ± 1.65	13.08 ± 3.04	14.75 ± 2.75	18.25 ± 3.10
Ajowan	14.83 ± 1.19	2.50 ± 2.30[b]	9.50 ± 4.14	3.83 ± 2.21[b]	3.16 ± 1.19[c]
Bay leaves	13.50 ± 1.82	5.83 ± 3.91	4.66 ± 1.40[a]	6.33 ± 2.80[a]	2.66 ± 0.71[c]
Defecation					
Control	2.00 ± 0.40	1.08 ± 0.259	0.58 ± 0.19	0.41 ± 0.19	0.33 ± 0.14
Ajowan	1.66 ± 0.33	1.83 ± 0.401	0.66 ± 0.21	1.00 ± 0.63	0.16 ± 0.16
Bay leaves	1.83 ± 0.40	0.33 ± 0.33	0.33 ± 0.21	0.00 ± 0.00	0.16 ± 0.16

Values are expressed as mean ± S.E.M (n = 6) in min. [a] $P < 0.05$, [b] $P < 0.01$, [c] $P < 0.001$

guided phytochemical evaluation of the plants is suggested.

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