



## Evaluation of Anxiolytic Activity in four selected species of Arisaema

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### ABSTRACT

**Background:** Arisaema is a large genus containing numerous species which are being used traditionally by the various tribes and communities for treatment of various ailments such as asthma bronchitis, cold, cough, laryngitis, ringworm, sores, boils, abscesses, as analgesic, antitumor, and pesticide agents. *Arisaema cumbile* for treating dementia and neurological symptoms. *Arisaema flavum* for tetanus, epilepsy, skin diseases and as insecticide. So taking into account traditional uses of genus, four species *A. tortuosum*, *A. jacquemontii*, *A. concinuum* and *A. flavum* are selected for evaluating antianxiety potential in species. **Method:** In the present investigation hydroalcoholic extracts of tubers are prepared. All the crude extracts are evaluated for antianxiety activity in mice using elevated plus maze and Y maze model of anxiety. **Result and Discussion:** Among all the extract *A. concinuum* and *A. flavum* exhibited significant antianxiety activity with respect to control as well as standard (diazepam 2mg/kg) while other extracts have also increased the time spent in open arms. **Conclusion:** From this study it can be concluded that arisaema species were found useful in treating or decreasing anxiety in animal models.

**KEY WORDS:** Antianxiety, Elevated plus maze, Y maze, *Arisaema tortuosum*, *A. jacquemontii*, *A. concinuum*, *A. flavum*

### INTRODUCTION

Human anxiety is defined as a feeling of apprehension, uncertainty or tension stemming from the anticipation of imagined or unreal threat<sup>1</sup>. Anxiety affects one-eighth population worldwide and has become an important research area in the field of psychopharmacology<sup>2</sup>. Benzodiazepines (BZDs), barbiturates, tricyclic antidepressants (TCA's) have been used for long time to treat anxiety disorders. The serious side effects associated with these drugs, namely rebound insomnia, sedation, muscle relaxation, withdrawal and tolerance (BZD's, barbiturates and alcohol), sexual dysfunction, anticholinergic, antihistaminic effects (TCA's) have limited their use in patients<sup>3</sup>. Due to this many pharmaceutical companies are conducting studies to find an alternative medicine or plant-derived medications with more specific anxiolytic effects<sup>4</sup>. Various types of herbal medicines have been used as anxiolytic agents in different part of the world, such as *Citrus aurantium* from Brazil-Indians, Afro-Brazilians and Caboclos<sup>5</sup>. Roots of kava plant

from the topical pacific region, and the saponin-containing fraction of leaves of *Albizia lebeck* from India are all known to have anxiolytic effects<sup>6</sup>. The major obstruction in the application of herbal medicine into medical practice is the lack of sufficient scientific and clinical data and better understanding of efficacy and safety of the herbal products.

Four species of genus Arisaema, *A. tortuosum*, *A. jacquemontii*, *A. concinuum* and *A. flavum* belonging to family Araceae are selected because these species are being used in ethnomedico practices from the ancient time. Like whole herb of *A. tortuosum* used to cure various ailments related to digestive tract like constipation, indigestion, abdominal pain and dysentery. It showed antinematodal activities and also used treat bone fracture<sup>7</sup>. Paste of the *tortuosum* tuber is applied over the wound caused by snake – bite to check poisonous effect. In case of abscess in the neck, dried powder of tuber is applied over the neck. It helps in early healing. The decoction of tuber is given to animals for early recovery of fractured bone. Also act as antinematodal<sup>8</sup>. *Arisaema jacquemontii* is used to treat fever, stomach problems, swelling, toothache, scabies, chest infection, uterus and menstrual disorder.

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ders, anthelmintic and throat<sup>9</sup>. A decoction of *concinuum* rhizome is given to cure menstrual disorder<sup>10</sup>. Tubers of *flavum* are used for toothache, stomachache and chest infection and Leaves are consumed as a laxative<sup>11,12</sup>.

A review of literature revealed that all four species are highly reputed plant, and have been widely employed in herbal medicine but very small work has been carried out on the various pharmacological effects of the plant extracts. So, the present study was designed to evaluate the anxiolytic effect of hydro alcoholic extracts of selectd Arisaema species using the EPM and Y maze an exteroceptive behavior animal model.

## **MATERIALS AND METHODS**

### **Plant Material**

The tubers of (*A. tortuosum*, *A. jacquemontii*, *A. conicinuum*, *A. flavum*) were procured from the bhimtaal and adjoining areas. The plant material was authenticated from National Botanical Research Institute Lucknow, India and the accession number for the specimens were 97822 (*A. tortuosum* Wall.), 97820 (*A. jacquemontii* Blume), 97821 (*A. conicinuum* Schott.), 97819 (*A. flavum* Forsk.). Authenticated plant material was washed, dried, coarsely powdered and stored in air tight container for further use.

### **Preparation of extracts**

The dried powder material was subjected to soxhlet extraction by hydro alcoholic (40% ethanol) solvent. Solvent was removed by evaporation and dried under reduced pressure and resulting semi-solid mass was dried under vacuum.

### **Test Animals**

The experimental animals [Swiss albino mice (20-25 gm) of either sex] were procured from the Animal House of Pharmacology department, Chattrapati Sahuji Maharaj Medical University, Lucknow. . The animals were given standard laboratory feed and water *ad libitum*. The experiments were performed between 8.00 am to 1.00 pm. All the experimental procedures and protocols used in the study were reviewed by the Institutional Animal Ethics Committee and carried out in accordance with ethical committee guidelines regarding the care and use of animals for experimental procedure.

### **Drugs**

Extracts and diazepam were suspended in the vehicle i.e., 1% (v/v)

Tween 80 in normal saline. Drugs and extracts were freshly prepared on the day of experiment.

## **Pharmacological evaluation**

Animals were divided into different groups of six animal each. One group serve as negative control and received 1% (v/v) Tween 80 in normal saline, another group was treated with diazepam (2mg/kg) and the rest groups were treated with different extracts in different doses as shown in Table 1. All the extracts, standard drug and control were administered orally 30 minutes prior to experiment.

## **Anxiolytic activity**

### **Elevated plus maze test**

The elevated plus maze apparatus consisting of two open arms (16x5cm) and two closed arms (16x5x12cm) having an open roof with the plus maze elevated (25 cm) from the floor was used to observe anxiolytic behavior in animals. Each mouse was placed in the central position facing an open arm and the percentage cumulative time spent in the open arm was recorded for 5min<sup>13</sup>.

### **Y maze**

Each mouse was placed at the centre of a Y-shaped wooden runway (Y maze, YM;70cm×15cm×12 cm) with one of the three arms closed. The percentage cumulative time spent by a mouse in the open arm was recorded for 5min<sup>14</sup>.

## **Statistical analysis**

The anxiolytic activities of the extracts, diazepam and control were analyzed by one-way analysis of variance (ANOVA). The test groups were compared with standard/control *post hoc* Tukey's multiple range test. Difference were considered significant at  $p < 0.05$ .

## **RESULTS**

### **Elevated plus maze test**

All the extracts (100–400 mg/kg) produced increase in the percentage time spent by mice in the open arm and percentage entries in open arm, 30 minutes after extract administration. The effect of the *concinuum* extract at 100 mg/kg was significantly more than the diazepam and effect of *flavum* extract at 100mg/kg was comparable to that of diazepam (2 mg/kg) (Fig. 1).

### **Y maze test**

All the extracts (100–400 mg/kg) produced increase in the percentage

Table 1. Antianxiety activity of hydroalcoholic extract

Treatment groups	Dose (mg/kg)	Elevated Plus maze		Y maze	
		% Time spent in open arm Mean±SEM	% Entry into open arm	% Time spent in open arm Mean±SEM	% Entry into open arm
Control	Vehicle	1.89±0.43b*	12.25	5.2±1.04b*	15.4
Diazepam	2	59.92±1.96a*	80.60	64.96±1.63a*	72.72
Tortuosum Ext	100	44.32±1.65a*,b*	70.73	50.5±2.25 a*,b*	62.37
	200	27.41±1.29a*,b*	59.98	31.79±0.61 a*,b*	56.34
	400	17.50±0.81a*,b*	51.28	20.87±1.74 a*,b*	51.45
Jacquemontii Ext	100	28.23±0.88a*,b*	63.37	30.66±1.91 a*,b*	53.06
	200	19.28±1.19 a*,b*	59.28	23.97±1.50 a*,b*	49.24
	400	12.10±0.51 a*,b*	54.74	14.73±0.86 a*,b*	45.23
Concinuum Ext	100	78.70±3.5a*,b*	76.09	88.76±1.84 a*,b*	81.55
	200	48.45±2.23 a*b*	74.78	59.38±2.01 a*	70.83
	400	19.07±0.65 a*,b*	65.01	27.59±1.96 a*,b*	50.75
Flavum Ext	100	55.38±1.76 a*	77.60	61.20±3.32 a*	68.00
	200	23.71±1.28 a*,b*	62.13	35.69±3.81 a*,b*	52.90
	400	15.23±1.68 a*,b*	57.50	27.57±1.66 a*,b*	46.32

The data was analyzed by one way ANOVA and post hoc Tukey's multiple range test \*p value < 0.05 is considered as significant. The data were expressed as mean ± S.E.M (a=p vs control and b=p vs dzp)

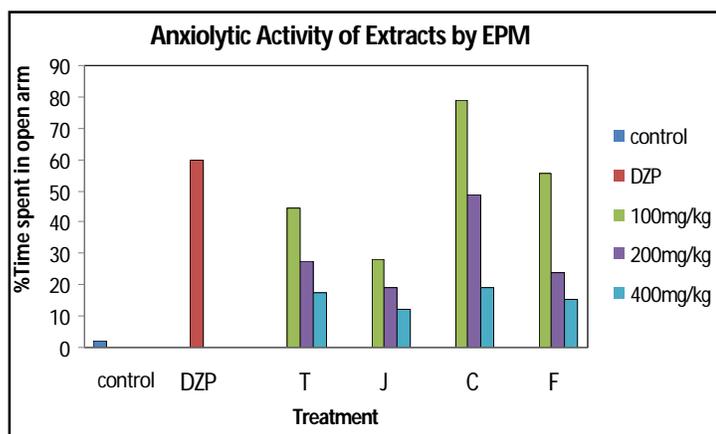


Fig 1. Anxiolytic Activity of Extracts by EPM

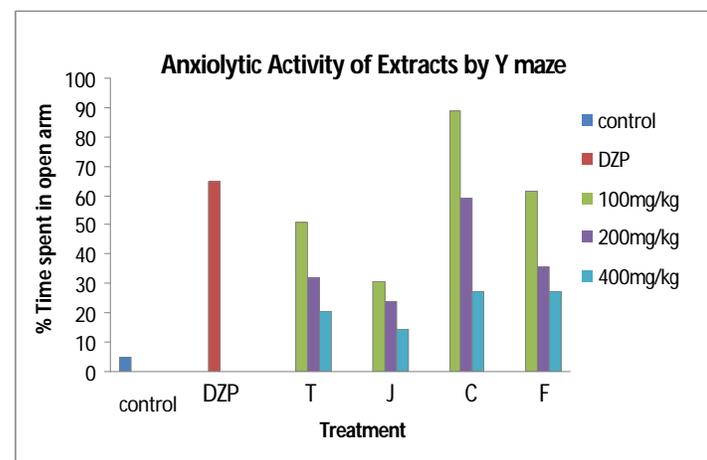


Fig 2. Anxiolytic Activity of Extracts by Y maze

time spent by mice in the open arm and percentage entries in open arm, 30 minutes after extract administration. The effect of the *concinuum* extract at 100 mg/kg was significantly more than the diazepam and effect of the *concinuum* extract at 200 mg/kg; flavum extract at 100mg/kg was comparable to that of diazepam (2 mg/kg) (Fig. 2).

DISCUSSION

Dried hydro-alcoholic extract of tubers, suspended in a suitable vehicle, was administered orally to mice, and the activity was compared with that observed in the control group as well as with the group treated with the standard anxiolytic drug diazepam. Complete manifestation of anxiety in mice of the control group is evident from the minimum percentage time spent in the open arms of elevated plus-maze by these animals. From this study it can be concluded that arisaema species were found useful in treating or decreasing anxiety in animal models. Among the doses tested, maximum anxiolytic activity was observed in *concinuum* and *flavum* extract in both models. However, the activity decreased at higher doses, which might be due to sedation.

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