

Research Article



A Study on Sedative and Hypnotic Activity of Fresh Fruit Juice of *Actinidia deliciosa* in Experimental Mice

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ABSTRACT

The current study involves the evaluation of sedative and hypnotic activity of fresh fruit juice of *Actinidia deliciosa* in experimental mice. Mice were orally administered with *Actinidia deliciosa* fresh fruit juice at a dose of 10 ml/kg and 20ml/kg and evaluated sedative and hypnotic activity by using animal models. The locomotor activity was tested by using an Actophotometer and the potentiation of pentobarbital induced sleep test and effect on muscle grip was analysed by using a rota-rod. Both the lower (10ml/kg) and higher dose (20ml/kg) of *Actinidia deliciosa* fruit juice showed dose dependent significant increase in sleep when compared with control. The locomotory activity was decreased in the locomotor activity test by Actophotometer, sleep time was prolonged in pentobarbital induced sleep time test, and muscle relaxant side effect was absent in the rota-rod test. The result obtained was comparable with that of the standard drug diazepam. The finding of the present study provides the evidence that the fresh fruit juice of *Actinidia deliciosa* can be beneficial against insomnia.

Keywords: *Actinidia deliciosa*, diazepam, sedative and hypnotic.

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There are many fruits that are used as sedatives and hypnotics. "*Actinidia deliciosa*" is one among them. Literature review reveals that consumption of the fruit *Actinidia deliciosa* helps to overcome insomnia.³ Though there is a paucity of scientific data for its sedative-hypnotic activity, the present study was selected to investigate the sedative-hypnotic activity of *Actinidia deliciosa* in mice.

MATERIALS AND METHODS

Plant Profile⁴

Family: Actinidiaceae

Genus: *Actinidia*

Species: *Deliciosa*

Botanical name: *Actinidia deliciosa*

Synonym: kiwi phal (Sanskrit), Kiwi fruit or Chinese gooseberry (English), kiwi phal (Hindi), kiwi hannu (Kannada), kedu (Marathi).

Experimental animals

Swiss albino mice (22-25g) of either sex was procured from animal house of Srinivas college of Pharmacy Mangalore, Karnataka. They were maintained under standard conditions (temperature 22 ± 2°C, relative humidity 50±5% and 12 h light/dark cycle). The animals were housed in sanitized polypropylene cages containing sterile paddy husk as bedding, they had free access to standard pellet diet and water.

Preparation of fruit juice

The fresh flesh of the fruit was weighed, cut into appropriate sizes, and the juice was extracted using a slow

INTRODUCTION

Insomnia is a common mental disorder in which a person experiences trouble falling asleep or staying asleep. Insomnia may have wide-ranging effects on the cardiovascular, endocrine, immune, and nervous systems, including obesity in adults and children, diabetes and impaired glucose tolerance, cardiovascular disease and hypertension, anxiety symptoms, depressed mood, and alcohol use. Depression is one of the most dangerous consequences of insomnia. Sleep deprivation leads to anxiety, lack of motivation, social quitting, and finally chronic depression that leads to suicidal tendencies.¹ There are many drugs, available in the market that are known to treat and manage insomnia, such as benzodiazepines, barbiturates, and newer drugs. But one of the biggest challenges is their side effects, which include burning or tingling in the hands, arms, feet, or legs, changes in appetite, constipation, diarrhoea, difficulty in keeping balance, dizziness, daytime drowsiness, dry mouth or throat, gastric problem, headache, heartburn, mental slowing or problems with attention or memory, stomach pain or tenderness, uncontrollable shaking of a part of the body, unusual dreams and weakness.²



juicer. Then the obtained juice is refrigerated and used for the current studies.

Pharmacological screening of sedative and hypnotic activity

Locomotor activity test⁵

The locomotor behaviour of the animal was monitored using an Actophotometer, provided with a digital counter, photocell, and a light source. Each animal was placed in Actophotometer for 5 minutes and the basal activity score was recorded. Each animal was treated with the respective drug and the activity score was recorded after 30 min and 1hr. Decreased activity score was taken as an index of sedation.

Potentiation of pentobarbital induced sleep time test⁶

The sleep evaluation method was based on the potentiation of pentobarbital-induced sleeping time. Briefly, the animals were given a single dose of the vehicles, diazepam, and extract. After 30 min, pentobarbital was injected to induce sleep. The mice were considered asleep if they stayed immobile and lost their righting reflex when positioned on its back. The time interval between pentobarbital injection and the onset of sleep was recorded as sleep latency and the sleep duration was also recorded.

Pharmacological screening of muscle co-ordination activity

Evaluation of Muscle co-ordination using Rota-rod apparatus:⁶

Mice were placed on a rod rotating at 20-25 rpm speed. Only the mice, which demonstrated their ability to remain on the revolving rod (20-25 rpm) for 5 min after training sessions during pre-test screening, were selected for studies. Fall off times were recorded in all groups before, and 30 minutes after drug administration. The decrease in fall off time suggests the fruit juice has a muscle relaxant effect as a side effect.

Statistical analysis

All data were expressed as Mean \pm SEM. The statistical significance between groups was compared using one-way ANOVA, followed by Tukey's multiple comparison test.

RESULTS

Determination of sedative and hypnotic activity

Following are the results obtained, showing the sedative and hypnotic activity of the fresh fruit juice of *Actinidia deliciosa*

Locomotor activity test

In this test, fresh fruit juice of *Actinidia deliciosa* was given orally to the mice. Standard drug diazepam was given at a dose of 2mg/kg through the intraperitoneal route. The locomotor activity of the animals was tested before and after administering the test and standard drug using an Actophotometer. The number of movements displayed on the digital counter was taken as the values for evaluation.

Potentiation of pentobarbital induced sleep time test

Briefly, the control and fresh fruit juice of *Actinidia deliciosa* were given orally and the standard drug, diazepam was given through the intraperitoneal route. After 30 min, pentobarbital (30 mg/kg, IP) was injected to induce sleep. The ability of standard and test drug to prolong the sleep time of pentobarbital were evaluated. The mice were considered asleep if stayed immobile and lost their righting reflex when positioned on its back. The time interval between pentobarbital injection and the onset of sleep was recorded as sleep latency and the sleep duration was also recorded.

Rota Rod test

In this test fresh fruit juice of *Actinidia deliciosa* were given orally to each mouse. Test was conducted for a period of 10 days by using Rota-rod apparatus. Standard drug diazepam 2mg/kg was given through i.p route. The animals were tested before and after administering test drug and standard drug diazepam. Ability to restrain in the revolving rod compared to standard were evaluated.

Table 1: Effect of locomotor activity of *Actinidia deliciosa* fresh fruit juice in mice

Drugs	Locomotor activity		
	Basal	After 30mins	After 60 mins
Control (saline)	210 \pm 0.3651	205 \pm 0.3651	204.5 \pm 0.2236
Diazepam (2mg/kg)	212 \pm 0.58	105.7 \pm 0.2236***	98.33 \pm 0.33***
<i>Actinidia deliciosa</i> (10ml/kg)	208.2 \pm 0.307	179.7 \pm 0.2108**	159.8 \pm 0.30**
<i>Actinidia deliciosa</i> (20ml/kg)	205.2 \pm 0.307	155.5 \pm 0.2236***	140.5 \pm 0.22***

Values are expressed as the mean \pm SEM. n=6. Data were analyzed by one-way ANOVA followed by Tukey's comparison test. *p<0.05, **p<0.01, ***p<0.001, as compared to control mice.

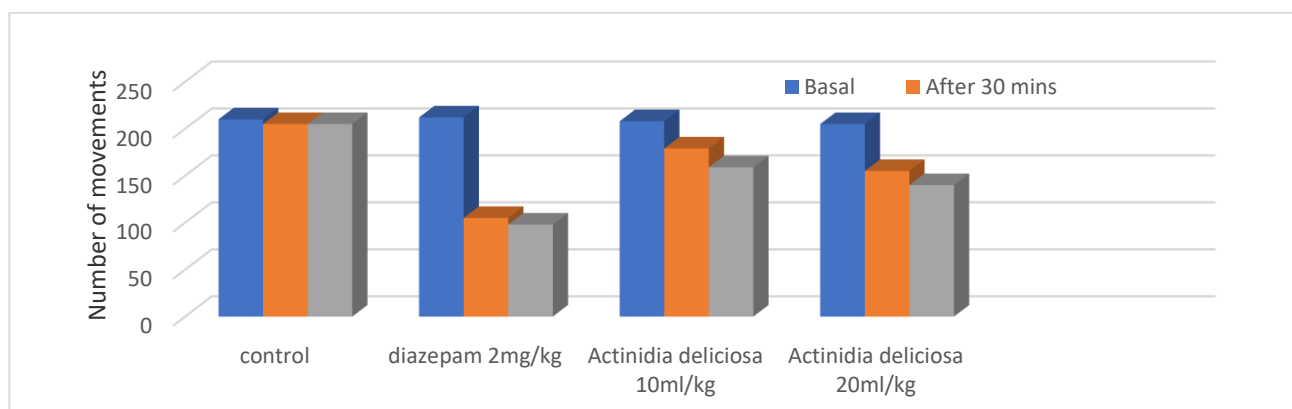


Figure 1: Effect of locomotor activity of *Actinidia deliciosa* fruit juice in mice.

Table 2: Potentiation of pentobarbital induced sleep time test in mice.

Drugs	Onset of sleep	Duration of sleep
Control (saline) + pentobarbital (30mg/kg)	9.16±0.166	31.83±0.30
Diazepam 2mg/kg + pentobarbital (30mg/kg)	3.5±0.22***	58.5±0.22***
<i>Actinidia deliciosa</i> 10ml/kg + pentobarbital (30mg/kg)	6.5±0.2236**	40±0.3651**
<i>Actinidia deliciosa</i> 20ml/kg + pentobarbital (30mg/kg)	5.5±0.2236***	47.50±0.2236***

Values are expressed as the mean ± SEM. n=6. Data were analyzed by one-way ANOVA followed by Tukey’s comparison test. *p<0.05, **p<0.01, ***p<0.001, as compared to control.

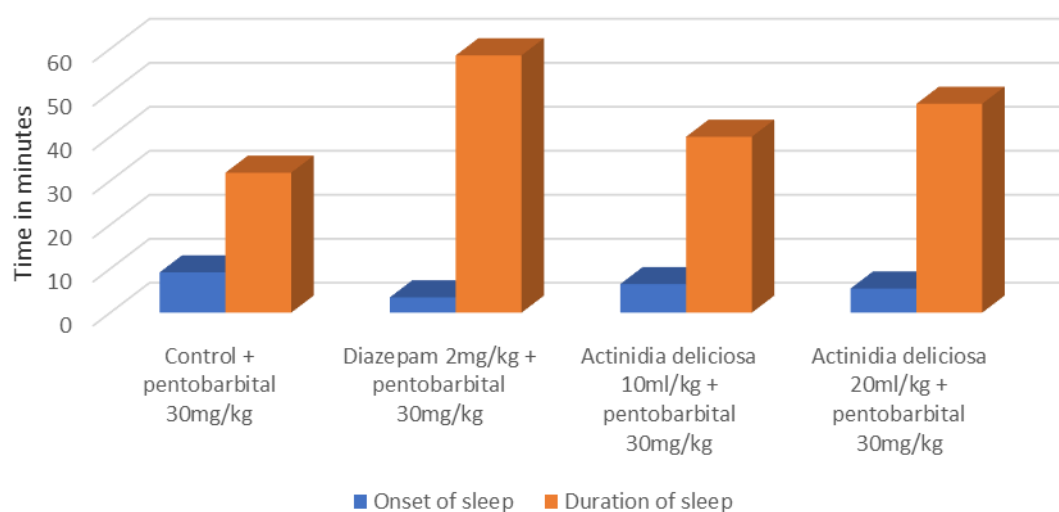


Figure 2: Prolongation of pentobarbital induced sleep time test in mice

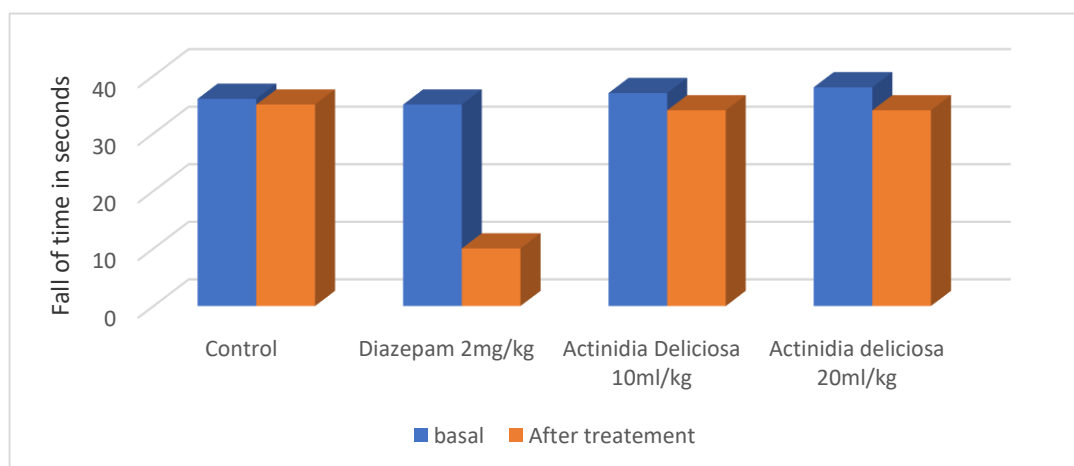


Figure 3: Muscle relaxant effect of *Actinidia deliciosa* fresh fruit juice in mice.

Table 3: Muscle relaxant effect of *Actinidia Deliciosa* fresh fruit juice in mice.

Drugs	Fall of time in seconds	
	Basal	After treatment
Control (saline)	36.33±0.33	35.50±0.2236
Diazepam (2mg/kg)	35.17±0.30	10±0.2582***
<i>Actinidia deliciosa</i> (10ml/kg)	37.61±0.33	34.17±0.3073*
<i>Actinidia deliciosa</i> (20ml/kg)	38.33±0.210	34.33±0.3333*

Values are expressed as the mean ± SEM. n=6. Data were analyzed by one-way ANOVA followed by Tukey's comparison test. *p<0.05, **p<0.01, ***p<0.001, as compared to control.

DISCUSSION

In the present study, the sedative and hypnotic activity of fresh fruit juice of *Actinidia deliciosa* were determined by using three different models. In the locomotor activity test, the mice showed a significant reduction in locomotion when compared with control but, not as significant as diazepam. The hypnotic activity was evaluated using prolongation of pentobarbital induced sleep time test and fresh fruit juice showed a significant increase in pentobarbital induced sleep time as compared to control but, not significant when compared to diazepam. Muscle relaxant activity was evaluated and observed that *Actinidia deliciosa* fresh fruit juice doesn't have muscle relaxant action like diazepam other than its sedative and hypnotic activity.

CONCLUSION

According to the findings of the current study, the fruit juice was found to have significant sedative and hypnotic activity in both the locomotor activity test and the pentobarbital induced sleep time test. An absence of muscle relaxant

activity was seen in the muscle coordination test using Rota-rod. Thus, the present study showed that the fruit of *Actinidia deliciosa* possesses sedative and hypnotic activity.

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