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Central Nervous System Activity of *Syzygium cumini* Seed

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Abstract: The *Syzygium cumini* (Myrtaceae) is a traditional medicine plant for the treatment of hypoglycemic, antibacterial, anti-HIV and antidiarrheal activities. The work reached the acute toxicity of *Syzygium cumini* and its action on the Central Nervous System (CNS) because no data in the literature have been found of pharmacological activity of this plant in the CNS. The seed was extracted with ethyl acetate and methanol and investigated for its Central Nervous System activity (CNS) of Albino mice in rota rod and actophotometer at the dose level of 200 mg/kg and 400 mg/kg. Both the extract exhibited significantly CNS activity. This study established CNS activity in *Syzygium cumini* seed.

Key words: *Syzygium cumini*, ethyl acetate, methanol, central nervous system

Introduction

Syzygium cumini (L) (Myrtaceae) is a medicinal plant locally known as 'Naaval' and it is also called as Eugenia jambolana, Jamun, Black plum and Indian black berry. It is a large evergreen tree up to 30m high, leaves opposite, simple, entire, elliptic to broadly oblong. Flowers are white 7.5-13 mm across in branched cluster at stem tips. Fruit variable in size up to 2.5 cm long, ellipsoid or oblong, black with juicy pulp. It is widely distributed through out India, Ceylon, Malaya and Australia. It has been valued in Ayurveda and Unani system of medication for possessing variety of therapeutic properties (Kirtikas and Basu, 1975). The seeds have hypoglycemic (Chopra *et al.*, 1958), antibacterial (Bhuiyan *et al.*, 1996), anti-HIV activity (Kusumoto *et al.*, 1995), antidiarrheal effects (Indira and Mohan, 1993). In the present study, we evaluated the CNS activity of *Syzygium cumini* seed.

Materials and Methods

Plant materials: The fully mature *Syzygium cumini* seeds were collected in June 2006, from Kattuppalayam village in Erode District of Tamil Nadu, India from a single tree. The seed was identified and authenticated by Dr. S. Amerjothy, Head of the Department of Plant Biology and plant Biotechnology, Presidency College, Chennai and voucher specimen (No. 1586) was deposited in the Herbarium of the Department.

Preparation of plant extracts: The *Syzygium cumini* fruits were first washed well and pulp was removed from the seeds. Seeds were washed several times with distilled water to remove the traces of pulp from the seeds. The seeds were dried at room temperature and coarsely powdered. The powder was extracted with hexane to remove lipids. It was then filtered and filtrate was discarded. The residue was successively extracted

with ethyl acetate and methanol using cold percolation method. The percentage yields were 1.81% in ethyl acetate and 10.36% in methanol.

Animals: Albino mice 20-25 gm were purchased from King Institute, Chennai for experimental standard. They were acclimated to animal house conditions, fed with commercial pelleted rats chow (Hindustan Lever Ltd., Bangalore, India) and had free access to water. The experimental protocol was approved by the IAEC (Institutional Animal Ethical Committee) of CPSEA.

Acute toxicity studies: Acute oral toxicity (Ecobichon, 1977), study was performed as per OECD-423 guidelines (acute toxic class method). Albino mice (n = 6) of either sex selected by random sampling technique were used for the study. The animals were kept fasting for overnight providing only water, after which the extracts (ethyl acetate and methanol) were administered orally at the dose level of 5mg/kg body weight by intragastric tube and observed for 14 days. If mortality was observed in 2-3 animals, then the dose administered was assigned as toxic dose. If mortality was observed in one animal, then the same dose was repeated again to confirm the toxic dose. If mortality was not observed, the procedure was repeated for further higher dose such as 50, 300 and 2000 mg/kg body weight.

Rota-rod test

Preparation of the drug for the experimental study: Extracts and the standard drugs were administered in the form of suspension in water with 1% Sodium Carboxy Methyl Cellulose (SCMC) as suspending agent.

Experimental protocol: The animals either sex were dividing into six groups each composed of six animals.

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Table 1: CNS activity by Rota rod method

Group	Fall off time (sec)		% decrease in time
	Before drug	After drug	
I	645±51.67	664.1±46.84	----
II	580.16±72.22	89±69.93**	86.54
III	625.66±60.18	58±15.84**	91.26
IV	726.5±81.37	651.83±38.73 ^{NS}	1.84
V	648.33±43.08	320±211.33*	51.81
VI	634.5±66.07	9.8±4.92**	98.52

Values are mean±SD six animals in each, Comparison were made between group I Vs II, III, IV, V and VI, p-values *p<0.01, **p<0.001

Table 2: CNS activity by Actophotometer method

Group	Locomotion activity 10 min		% change in activity
	Before treatment	After treatment	
I	207.52±19.50	201.0±9.44	----
II	187.50±20.09	90.30±9.77 [†]	55.07
III	230.30±23.59	97.16±16.55 [†]	67.41
IV	217.32±30.80	141.0±33.89 [†]	29.85
V	210.33±30.80	65.5±11.80 [†]	51.66
VI	214.83±22.48	39.67±14.6 [†]	84.27

[†]p<0.001

Group I: Control animals received 1% SCMC 10 ml/kg p.o.

Group II: Animals received Ethyl acetate extract at the dose of 200 mg/kg p.o.

Group III: Animals received Ethyl acetate extract at the dose of 400 mg/kg p.o.

Group IV: Animals received Methanol extract at the dose of 200 mg/kg p.o.

Group V: Animals received Methanol extract at the dose of 400 mg/kg p.o.

Group VI: Standard Diazepam 4 mg/kg, p.o.

Procedure: After the administration of the drugs 1 hr later the animals placed one by one on the rotating rod. Note down the "fall of time". When the mouse falls from the rotating rod. Compare the fall off time of control animals and drug treated animals (Kulkarani, 1999).

Actophotometer

Preparation of the drug for the experimental study: Extracts and the standard drugs were administered in the form of suspension in water with 1% Sodium Carboxy Methyl Cellulose (SCMC) as suspending agent.

Experimental protocol: The animals either sex were dividing into six groups each composed of six animals.

Group I: Control animals received 1% SCMC 10 ml/kg p.o.

Group II: Animals received Ethyl acetate extract at the dose of 200 mg/kg p.o.

Group III: Animals received Ethyl acetate extract at the dose of 400 mg/kg p.o.

Group IV: Animals received Methanol extract at the dose of 200 mg/kg p.o.

Group V: Animals received Methanol extract at the dose of 400 mg/kg p.o.

Group VI: Standard Chlorpromazine hydrochloride 5 mg/kg, p.o.

Procedure: After administration of the drug, one hour later all the animals placed in the actophotometer for 10 min. Record the score of the locomotor of the animals and compare with the control animals (Kulkarani, 1999).

Statistical analysis: Data obtained from pharmacological experiments are expressed as mean±SD. Difference between the control and the treatments in these experiments were tested for significance using ANOVA followed by Dunnet's *t*-test (Dixon and Jennrich, 1990).

Results

Acute toxicity studies: Acute toxicity studies showed no mortality upto the doses of 2000 mg/kg body weight. So, the extracts safe for long term administration.

Rota rod test: The ethyl acetate and methanol extracts of *Syzygium cumini* seed at the dose level of 200 and 400 mg/kg administrated orally exhibited significant reduction of activity compared with control group of animals. The standard diazepam also exhibited significant reduction CNS activity compared with control animals.

Actophotometer: The ethyl acetate and methanol extracts of *Syzygium cumini* seed at the dose level of 200 and 400 mg/kg administrated orally exhibited significant reduction of activity compared with control group of animals. The standard chlorpromazine also exhibited significant reduction in CNS activity compared with control animals.

Discussion

Acute toxicity studies indicate that *Syzygium cumini* seed extract can be used safely in the animals up to the dose of 2000 mg/kg body weight. In loco-motor activity assessed by actophotometer and the decrease in grip by rota-rod, which was found to be dose dependent. Decrease on locomotion reveals depression effect on CNS (Leewanich *et al.*, 1996). The CNS depressant activity may be due to the increase in the concentration of GABA in brains (Nagarjun *et al.*, 2003). In the present study; the extract of *Syzygium cumini* significantly decreased the spontaneous loco-motor activity in mice indicating central depressant effect (Morais *et al.*, 1998).

Conclusion: Saponins are known to have antagonistic activity against amphetamine, sedative property and

decrease, Spontaneous motor activity in experimental animals (Wagner *et al.*, 1983; Dubois *et al.*, 1986). In conclusion, the results of the present study support to the traditional use of *Syzygium cumini* seed extracts possessing significant CNS activity due to the presence of saponins, deserves further studies to establish its therapeutic value as well as its mechanism of actions.

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