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Research Article

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CNS stimulant activity of aqueous extract of roots of *Boerhavia diffusa* in mice

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ABSTRACT

Aqueous extracts of roots of Boerhavia diffusa were evaluated for their CNS stimulant activity on mice. Mice were divided into five groups of six animals each. Group I was given normal saline and served as control. Group II was given caffiene in the dose of 30mg/kg by oral route and served as standard. Group III, IV and V were given extracts of Boerhavia diffusa in lower, medium and higher dose i.e. 100, 200 and 400 mg/kg body weight by oral route respectively. After 60 min of oral administration, CNS activity of mice was evaluated using rota rod and actophotometer models. Motor coordination and locomotor activity was found to be increased in medium and high dose as compare to control group and were found to be comparable with standard group. The results suggested CNS stimulant activity of aqueous extract of Boerhavia diffusa at medium and high dose.

Keywords: *Boerhavia diffusa*, CNS stimulant, rota rod, actophotomotor, locomotor activity, motor coordination.

INTRODUCTION

Herbal medicines are in great demand in the developed world for primary health care due to their efficacy, safety and lesser side effects. India despite its rich traditional knowledge, heritage of herbal medicines and large biodiversity has a dismal share of the world market due to export of crude extracts and drugs [1].

Central nervous system (CNS) stimulation is the primary action of a diverse group of pharmacological agents and an adverse effect associated with the administration of an even larger group of drugs. CNS stimulation consists of a range of behaviors including mild elevation in alertness, increased nervousness and anxiety and convulsions. In general, any hyper excitability associated with drug administration results from an alteration in the fine balance normally maintained in the CNS between excitatory and inhibitory influences. Tolerance and abuse potential are the problems associated with the use of psychomotor stimulants as amphetamine and many of its congeners [2].

Punarnava (Hogweed) literally means ‘bring back to life’ or ‘renewer’. It is a creeper that grows wild in India and Brazil throughout year but dries during the summer. It bears small fleshy leaves, small reddish pink flowers and fruits in winter. It is bitter in taste and has cooling effect. It has very high medicinal value. Similar to its name it rejuvenates the whole body i.e. with routine use of Punarnava a fellow become young again – full of vigor and vitality. Punarnava corrects the digestive system, alleviates fluid retention and very useful in managing heart diseases. Punarnava also benefits in anemia, hernia and respiratory distress. Punarnava can also be taken in liver problems and managing lipids and cholesterol in healthy limits [3].

The roots have been reported to contain alkaloids (punarnavine), rotenoids (boeravinones), flavonoids, amino acids, ligans (liriodendrons), ß sitosterols, and tetracosanoic, esacosanoic, stearic and ursolic acids [4].

The plant has been proved to have many biological activities like Immunomodulatory effects [5], immunosuppressive activity [6], anti diabetic [7], anti metastatic [8], anti oxidant [9], antiproliferative and anti

estrogenic [10], analgesic and antiinflammatory [11], antilymphoproliferative [12], hepatoprotective [13], antibacterial activity [14] etc.

The aim of present study was to investigate CNS stimulant activity of aqueous extracts of roots of *Boerhavia diffusa* in mice.

EXPERIMENTAL SECTION

Plant extracts:
Aqeous extract of roots of *Boerhavia diffusa* was obtained from Green Chem Herbal Extracts and Formulations, Bangalore.

Experimental animals:
Albino mice of either sex (20-30 gms) were obtained from the animal house of Krupanidhi College of Pharmacy, Bangalore, India approved by CPCSEA (378/01/ab/CPCSEA). All the animals were maintained in a well ventilated room and given access to feed and water *ad libitum*.

Experimental protocol:
Animals were divided into five groups of six animals each. Group I was given normal saline and served as control. Group II was given caffeine in the dose of 30mg/kg by oral route and served as standard[15]. Group III, IV and V were given extracts of *Boerhavia diffusa* in lower, medium and higher dose i.e. 100, 200 and 400 mg/kg body weight by oral route respectively. The three doses has been selected based on toxicity studies done earlier.[16] After 60 min of oral administration, CNS activity of mice were evaluated using rota rod and actophotometer models.

Rota rod model:
Mice were divided into five groups of six animals each. Group I was given normal saline and served as control. Group II was given caffeine in the dose of 30mg/kg by oral route and served as standard. Group III, IV and V were given extracts of *Boerhavia diffusa* in lower, medium and higher dose i.e. 100, 200 and 400 mg/kg body weight by oral route respectively. After 60 min of oral administration, CNS activity of mice was evaluated using rota rod model [17].

Actophotometer model:
Mice were divided into five groups of six animals each. Group I was given normal saline and served as control. Group II was given caffeine in the dose of 30mg/kg by oral and served as standard. Group III, IV and V were given extracts of *Boerhavia diffusa* in lower, medium and higher dose i.e. 100, 200 and 400 mg/kg body weight by oral route respectively. After 60 min of oral administration, CNS activity of mice was evaluated using rota rod and actophotometer models [17].

Statistical analysis:
The results of this study are expressed as mean ±Std error of mean (Mean± SE). Statistical analysis was done by using one-way ANOVA followed by Dunnet's multiple comparison test. All values of $p<0.05$ were considered statistically significant.

Results and Discussion:
Locomotor activity: Locomotor activity was found to be increased in extract treated animals. The aqueous extract at the low and medium dose exhibited significant increase in locomotor activity compared to control. CNS stimulant activity of extracts was also comparable to control drug caffeine.

Table 1: Effect of aqueous extract of *Boerhavia diffusa* on locomotor activity of mice

S NO	GROUPS	DOSE (mg/kg *p.o.*)	TIME SPENT(s)
1	Control (Normal Saline)	-	230±6.952***
2	Standard (Caffiene)	30	387.3±3.442
3	Low Dose	100	246.3±4.492
4	Medium Dose	200	362±3.183***
5	High Dose	400	382±4.405***

Values are taken from MEAN±SEM of 6 animals $^{***}P<0.05$
$^{***}P<0.05$ *when compared with Control*

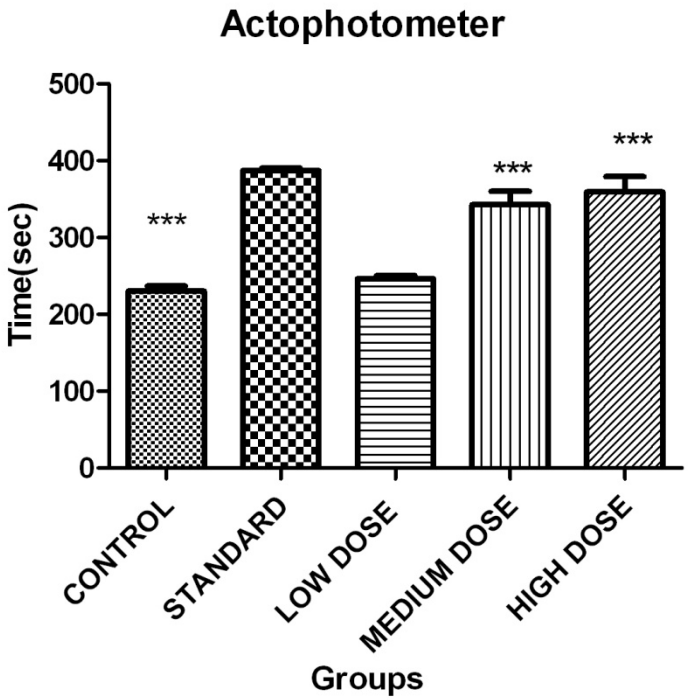

Figure 1: Effect of aqueous extract of *Boerhavia diffusa* on locomotor activity of mice

Motor coordination: The excitation induced by CNS stimulants may lead to increases in motor coordination resulting in increase time spent on rotating rod. The aqueous extract at the low and medium dose exhibited significant increase in time spent on rota rod as compared to control. CNS stimulant activity of extracts was also comparable to control drug caffeine.

Table 2: Effect of aqueous extract of *Boerhavia diffusa* on motor coordination activity of mice

S NO	GROUPS	DOSE (mg/kg *p.o.*)	TIME SPENT(s)
1	Control (Normal Saline)	-	63±2.733***
2	Standard (Caffiene)	30	123.5±3.481
3	Low Dose	100	66.83±3.449
4	Medium Dose	200	111.2±4.393***
5	High Dose	400	126.3±3.293***

Values are taken from MEAN±SEM of 6 animals P
****P<0.05 when compared with Control*

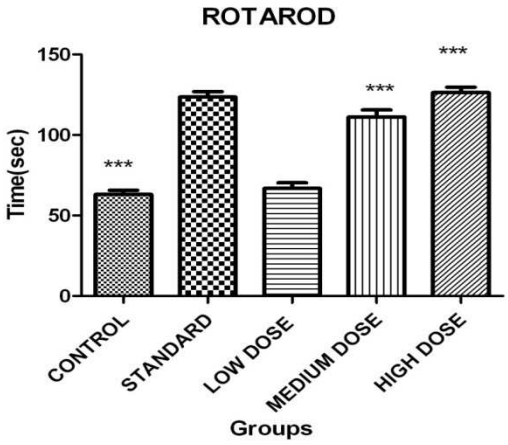

Figure 2: Effect of aqueous extract of *Boerhavia diffusa* on motor coordination activity of mice

CONCLUSION

The experimental results concluded that the aqueous extract of roots of *Boerhavia diffusa* possesses CNS stimulant activity as compared to control group. This activity is may be due to the active chemical constituents which are present in the roots. Further studies can be done to confirm the activity and to know the exact mechanism of action.

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