

ANTICONVULSANT AND SEX ENHANCING EFFECTS OF *IPOMOEA HEDERACEA* SEEDS EXTRACT

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Abstract

The crude methanolic extract of *Ipomoea hederacea* seeds also known as ivy-leaved morning glory was evaluated in terms of anticonvulsant and sex enhancing effects on albino rats. Male albino rats were divided into five groups and were orally administered *Ipomoea hederacea* seeds extract of 25, 50 and 75 mg/kg body weight for the three groups, the remaining two groups were used as control and reference. The *Ipomoea hederacea* seeds extract showed anticonvulsant effects at higher concentrations (i.e. 50 and 75 mg/kgbw). Furthermore, the evaluation of sex enhancing effects showed increased level in mount frequencies, which represents an increased *libido*.

Our investigations have been proved to be promising in terms of future potential applications of extract as anticonvulsant and sex enhancer probably due to the presence of lysergic acid derivatives and clavine alkaloids which could be used in a range of phytochemicals composition and/or different pharmaceutical use.

Rezumat

Extractul metanolic crud al semințelor de *Ipomoea hederacea*, cunoscută ca și frunza de iederă, a fost evaluat pentru efectele anticonvulsivante și consolidarea împerecherii la șobolanii masculi albino.

Șobolanii albino de sex masculin au fost împărțiți în cinci loturi cărora le-au fost administrate extractele de *Ipomoea hederacea* sub formă orală în doze de 25, 50 și 75 mg/kg corp la trei grupuri, celelalte două fiind folosite ca martor, respectiv referință.

Extractul de *Ipomoea hederacea* a arătat efecte anticonvulsivante la concentrații ridicate (de exemplu 50 și 75 mg/kgc). Mai mult, evaluarea consolidării împerecherii a prezentat nivele crescute a frecvențelor de montă, reprezentând semnale pozitive a creșterii libidoului.

Investigațiile noastre s-au dovedit a fi promițătoare în viitoarele aplicații ale extractului ca anticonvulsivante și consolidarea împerecherii datorate probabil prezenței

derivaților de acid lisergic și alcaloizilor de clavină care pot fi folosiți într-un variat spectru de fitochimice și/sau diferite utilizări farmaceutice.

Keywords: *Ipomoea hederacea* seeds, anticonvulsant effects, sex enhancer.

Introduction

Approximately 450 million people around the world suffer from a behavioural or mental disorder. Only a few of this population receive basic treatment. Traditional medicine therefore enjoys high patronage in the treatment of central nervous system disorders [1].

Ipomoea hederacea also known as ivy-leaved morning glory is an annual trailing vine which is considered to originate from American tropics and now distributed in subcontinent. The plant has a high medicinal value, considering its broad spectrum of pharmacological actions [2]. The seeds were associated with normalization of lung, kidney, and small and large intestine functions as it removes phlegm, water, stool and parasites and enhances functions of these organs. Anticonvulsant effects of seeds were also reported in literature [3].

Successful treatment of sexual dysfunction may affect sexual relationships as well as the overall quality of life. The incidence of sexual inadequacy in humans has led to the development of a number of available treatment options, presenting serious side effects. This impact further conducted to other studies which address the use of more and more drugs from natural resources [1, 2].

The World Health Organization showed that *Ipomoea hederacea* seeds are claimed to be useful in treating syphilis, bleeding piles, calculus diseases, dyspnea, abdominal pain, tuberculosis, and used as antidote for hydrophobia. These are known to be useful for treating sterility and further increasing fertility [4]. However, until present no other scientifically study reported such effects.

In the present study, anticonvulsant and sex enhancing effects of *Ipomoea hederacea* methanolic extracts were assessed.

Materials and Methods

Extraction characterization

Seeds of *Ipomea hederacea* were collected from the botanical garden of Bahaudin Zakariya University, Multan in July, 2012. The plant was identified by the kind cooperation of Saima Shahzadi of Institute of Pure and Applied Biology.

A voucher specimen was deposited in herbarium of the same Institute. The seeds (5 kg) were ground to powder and it was macerated with our aqueous methanolic mixture (15 L, 80:20; v/v), at room temperature for 7 days with occasional shaking. The process was repeated three times with the same quantity of solvent mixture. The extracts obtained were combined, filtered through filter paper under vacuum and concentrated under reduced pressure on a rotary evaporator (Q-344B-Quimis, Sao Paulo, Brazil) using a warm water bath (Q-214M2-Quimis), further dried in a desiccator and stored at 4°C until use.

Animal model

Male albino rats, weighing 150 to 200 g, were randomly divided into 5 groups (5 rats per group), three groups for experiment, the remaining two were the reference and the control group as solvent and positive controls. Animals were housed in standard polycarbonate cages with free access to water and were maintained on a 12:12-h light/dark cycle in a climatized room.

All animals used in this study were maintained in a facility accredited by Helsinki Declaration and guidelines of the Ethics Committee of the International Association for the Study of Pain. They were approved by the Animal Care Committee of the Bahauddin Zakariya University from Pakistan. Also, animals received human care in accordance with the National Institutes of Health's Guide for Care and Use of Laboratory Animals.

Anticonvulsant activity

Group I served as solvent control, and received 0.9% w/v of saline (1 mL/kgbw), Group II received diazepam (1 mg/kgbw), but considered as reference and Groups III, IV and V received *Ipomoea hederacea* seeds extract at per doses of 25, 50 and 75 mg/kgbw. All the drugs were administered orally 30 min prior to the administration of pentylenetetrazol (6 mg/kgbw) by subcutaneous route. The animals were observed for 1 h by placing in a separate cage. The duration of seizures or convulsions was recorded [5, 6].

Sexual behaviour test

Sexual behaviour test was carried out according to the method of Yakubu et al [7]. First, the animals were familiarized to the behaviour testing environment i.e. exposed to dim light at the stipulated time of testing daily for 6 days before the experiment. Females were brought into oestrus by giving a single dose of 500 µg/animal oestradiol benzoate 48 h prior to pairing and then injecting progesterone subcutaneously at a dose of 5 mg/kgbw, 4 h before the experiment. The most receptive females were

selected for the study. The sexual behaviour was assessed daily for 28 days after commencement of the treatment of male albino rats. Sexual behaviour monitoring was conducted in a darkened room 2 h after 25, 50 and 75 mg/kgbw day's extract administration. In this test, female rats were introduced into the cages of the male animal with 1 female to 1 male ratio. The observation for mating behaviour was started immediately and parameters were recorded as they occurred for 20 min. The parameters of male sexual behaviour that were monitored were mount frequency, number of intromissions from the time of introduction of the female and ejaculation frequency.

Statistical analysis

All the aforementioned experiments were conducted in triplicate. Statistical comparisons were performed by one-way analysis of variance (ANOVA) followed by Dunnett's t-test using SPSS version 12.0 (SPSS Inc., Chicago, IL, USA). Probability values $p < 0.05$ were considered to indicate significant differences.

Results and Discussion

In the present study, it was found that the oral administration of methanol extract of *Ipomoea hederacea* seeds induced sedative effects in rats. The proposed regulatory functions of 5-hydroxytryptamine (HT)-containing neurons and angiotensin II, include sleep, temperature, appetite, and neuroendocrine control. Strikingly, these two pathways may be involved in the strong oxytocic effect, hallucinations and anticonvulsant effects and further 5-HT_{2A} receptor to be considered the main molecular target [8, 9, 10]. Other studies sustain the role of angiotensin II which could induce an oxytocic effect in Sprague Dawley rats leading to an increase sexual behaviour [11]. Having in the view lysergic acid derivative and some other clavine alkaloids which were founded in the *Ipomoea hederacea* seeds we believe that these compounds could be responsible for such anticonvulsant effects of *Ipomoea hederacea* seeds [8].

Moving forward, the orientation of male animals towards females showed that males treated with the extract displayed more frequent and vigorous response towards females and showed more attraction towards females as compared to control. *Ipomoea hederacea* treatment used in different doses produced a significant ($p < 0.01$) increase in the number of mounts compared to controls (Figure 1). There was a highly significant increase ($p < 0.01$) in the number of intromissions and ejaculations for both medium and high dose *Ipomoea hederacea* treated rats compared to controls (Figures 2 and 3). The medium dose (50 mg/kgbw) was more effective in

eliciting intromissions than the higher dose (75 mg/kgbw) of *Ipomoea hederacea* extract. Therefore, both doses elicited an increase in sexual behaviour compared to control.

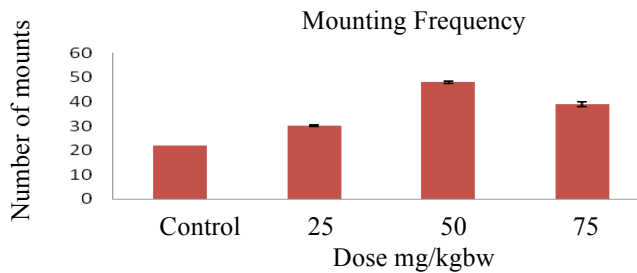


Figure 1

Effect of 28 day treatment with 25 mg/kgbw, 50 mg/kgbw and 75 mg/kgbw *Ipomoea hederacea* on mount frequency during a 20 min sexual behaviour observation. Values are presented as mean \pm SD ($p < 0.01$ compared to controls).

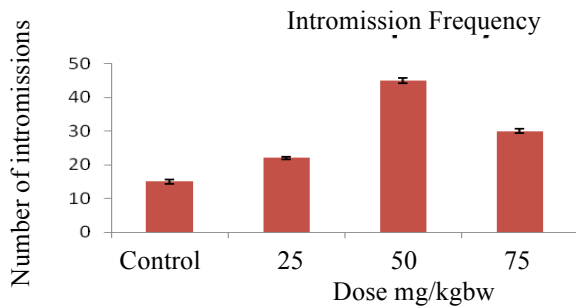


Figure 2

Effect of 28 day treatment with 25 mg/kgbw, 50 mg/kgbw and 75 mg/kgbw *Ipomoea hederacea* on the number of intromissions during a 20 min sexual behaviour observation. Values are presented as mean \pm SD ($p < 0.01$ compared to controls).

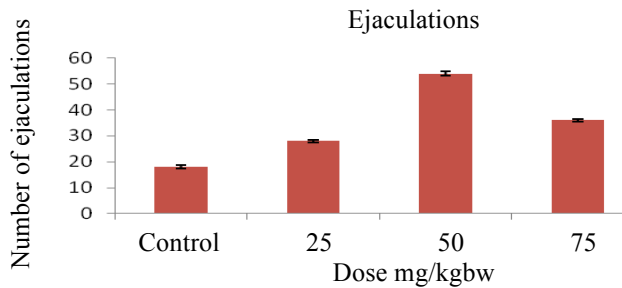


Figure 3

Effect of 28 day treatment with 25 mg/kgbw, 50 mg/kgbw and 75 mg/kgbw *Ipomoea hederacea* on the number of ejaculations during a 20 min sexual behavior observation. Values are presented as mean \pm SD ($p < 0.01$ compared to controls).

The present study showed that *Ipomoea hederacea* seeds possess sexual enhancing effects on male rats as evidenced by the increased mounting and intromission frequencies which increased the number of subsequent ejaculations. These parameters are considered to be a measure of both *libido* and potency [11]. The mounting, intromission and ejaculations frequencies which were increased in our experiments showed that *Ipomoea hederacea* treatment enhances both *libido* and potency in normal rats.

Conclusions

Our results revealed that the crude methanolic extract of *Ipomoea hederacea* seeds can be used as anticonvulsant and sex enhancer agent which could be due to the presence of lysergic acid derivatives and clavine alkaloids and further to be used in a range of phytochemicals composition and for different pharmaceutical uses.

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