

Phytochemical evaluation and investigations in to sedative properties of *Datura stramonium* (Linn) seeds in experimental mice

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Abstract: *Datura stramonium* L is used as a sedative for the management of insomnia, and the seeds have long been used as drug of abuse by the young people for hallucination purpose. The present study was designed to investigate the sedative properties of seeds extract of *D. stramonium* using animal model. Diazepam-induced sleeping time test was used in this investigation. Phytochemical screening of the aqueous seed extract shows the presence of Tannins, cardiac glycosides, anthraquinones, saponins, triterpenes, flavonoids as well as alkaloids. The seeds extract of *D. stramonium* significantly ($p < 0.01$) increased the duration of sleep induced by diazepam at a dose of 40 and 80mg/kg b.wt. In conclusion, the results of our current investigations revealed that *D. stramonium* may possess sedative properties which support the use of the seeds extract for the management of insomnia.

Keywords: *Datura stramonium*, diazepam, GABA_A receptors, insomnia, phytochemical evaluation,

I. Introduction

Insomnia is a widespread health complaint and the most common sleep disorders that affect people of all ages around the world [1, 2]. About 10-15% of adult population suffers from chronic insomnia, and additional 25-35% has transient or occasional insomnia [3]. The most widely used drugs in the management of insomnia are benzodiazepines such as diazepam. The use of benzodiazepines in the management of insomnia is associated with well known problems such as 'hangover' effects, dependence, addiction, withdrawal symptoms and subsequent drug resistance [4].

Datura stramonium L. (family solanaceae) is an annual herb which forms a bush and grows from 1 to 1.5m in height. It is commonly known as jimsonweed, thorn apple, angel's trumpet and devil's trumpet [5] and however, it is commonly known as babajiji in part of Northern Nigerian. It grows wild in most tropical countries including Nigeria, Bangladesh, India, and South America. *D. stramonium* is used as a mydriatic agent, as a sedative for the management of insomnia, an anodyne [6] and the seeds have long been used as drug of abuse by the young people for hallucination purpose. It contains toxic anticholinergic alkaloids atropine, scopolamine and hyosциamine [7]. Atropine and scopolamine are competitive antagonists of muscarinic cholinergic receptors and are central nervous system depressants [8]. All parts of the plant are toxic, but the highest amount of the alkaloids is contained in ripe seeds [9, 10].

Despite the frequent uses of *D. stramonium* for the management of insomnia, there are currently no scientific reports on sedative properties *D. stramonium*. However, this study was aimed to investigate sedative properties of seeds extract of *D. stramonium* using animal model.

II. Materials And Method

2.1 Plant material, animals, and drugs

The plant material was collected around the bushes at the eastern bypass in Sokoto, on 20th Oct, 2012. The plant was taxonomically identified at the herbarium section of the Biological Science Department, Usmanu Danfodiyo University, Sokoto and kept for referencing.

Adult Swiss albino mice of both sexes weighing 21-30g were obtained from Department of Pharmacology and Toxicology, Faculty of Pharmaceutical sciences, Usmanu Danfodiyo University and were kept at the animal house under controlled environment at 22±2^oC. The animals were allowed to acclimatize under standard feeds and water access for a period of 2 weeks before the commencement of the experiment under which twelve hours light and twelve hours dark cycle was ensured. All procedure followed were in accordance with the ethical standard of the European Union Guidelines for Animals Experimentation and approved by the Institutional Animal Care Committee.

The seeds extract of *Datura stramonium* was prepared by simple maceration technique in aqueous for 48h and concentrated by evaporation at reduced temperature. The solid extract obtained was dissolved in distilled water for pharmacological studies. Diazepam was supplied from BDH Ltd, Poole, England.

2.2 Phytochemical screening

The various chemical constituents of the seeds extract were carried out in accordance with the standard protocol as described Trease and Evans [11].

2.3 Diazepam-Induced Sleeping Time test

A method described by Beretz [12] and modified by Rakotonirina [13] was adopted to evaluate sleep potentiating effect of the seeds extract. The animals were randomly divided in to four groups of five animals each (n=5). All the animals received the drug by intraperitoneal injection. One control group received normal saline (1m/kg b.wt). Three groups received test extract (20, 40 and 80mg/kg b.wt) respectively. All animals were administered diazepam (3mg/kg, b.wt) 30 min after administration of normal saline or the test extract. The time between the loss of the straightening reflex and the regain of this reflex was measured as the sleeping time.

2.4 Statistical analysis

The results were expressed as means±SD using one-way ANOVA followed by Dunnett's test for multiple comparisons.

III. Result and discussion

Phytochemical screening of aqueous seed extract of *Datura stramonium* shows the presence of Tannins, cardiac glycosides, anthraquinones, saponins, triterpenes, flavonoids and alkaloids. The seeds extract of *D. stramonium* at a dose of 20mg/kg showed no significant ($p>0.01$) different from the normal control. However, at a dose of 40 and 80mg significantly ($p<0.01$) potentiated by increasing the duration of sleep induced by diazepam in a dose-dependent manner (Fig. 1).

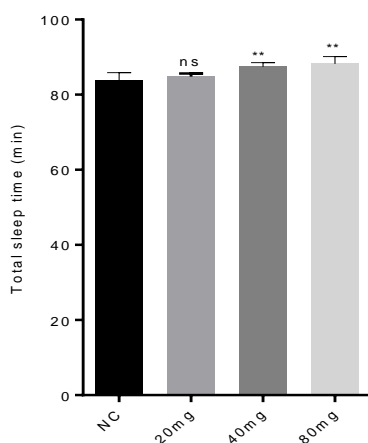


Fig. 1. Effect of *D. stramonium* on diazepam-induced sleep in rats. Data are expressed as mean±SD, n=5, ** $p<0.01$, ns: non significant when compared to the normal control, NC: normal control

Diazepam-induced sleeping time test model is considered to be a valid animal model to test for sedative effects of drugs. Potentiation of diazepam-induced sleep by plant extracts suggests that they possess sedative property [14]. However, our current findings showed that *D. stramonium* increased the duration of sleep induced by diazepam at the dose of 20, 40 and 80mg/kg. The sedative effects might suggest that *D. stramonium* may possibly act by interacting with GABA_A receptor via their benzodiazepines-binding site. GABA (γ -amino butyric acid) systems are known to play an important role in sleep and positive allosteric modulators of GABA_A receptor (e.g. benzodiazepines) are widely used to promote restful sleep [15]. Studies have shown that flavonoids present in the plant are able to modulate GABA_A receptors [16]. Therefore, it's north worthy to suggest that flavonoids detected in the plant extract may be responsible for the pharmacological effects observed in this investigation.

IV. Conclusion

In conclusion, the result of our present investigations shown *Datura stramonium* possessed sedative properties which support the use of the seeds extract in traditional medicine for the management of insomnia. However, we may suggest that the sedative properties of *D. stramonium* may be due to the presence of flavonoids detected in the seeds extract which exert their effect on GABA_A receptors.

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