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Evaluation of anti anxiety activity of Datura seeds in mice

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Abstract

Objective: The aim of the present work was to evaluate the anti-anxiety activity of ethanolic extract of *Datura stramonium* (leaves).

Methods: Elevated plus-maze apparatus were used for finding anti-anxiety activity of the ethanolic extract of *Datura stramonium* (leaves). Pre-treated animals were placed individually for 5 min in the maze. The number of entries into the open and closed arm, time spent in each arm and the number of entries in both the arms was noted.

Results: The result showed that the ethanolic extract of leaves of *Datura stramonium* (100 and 200 mg/kg) and diazepam (1 mg/kg) induced significantly ($P<0.01$) increase in the occupancy in the open arm and showed a decrease preference for the closed arm entries.

Conclusion: Administration of ethanolic extract of leaves of *Datura stramonium* (100 and 200 mg/kg) possessed significant antiaxiety effects as compared to control.

Keywords: Anxiety, elevated plus maze, *Datura stramonium*, Anti-anxiety activity

Anxiety is a psychological and physiological state characterized by somatic, emotional, cognitive, and behavioral components, associated with significant disability (including educational and occupational) which has a negative impact on the quality of life [1]. Anxiety disorder is increasingly recognized as a highly prevalent and chronic disorder with onset during the teenage years, with an incidence of 18.1% and a lifetime prevalence of 28.8%. [2] Individuals are spending lot of money to rid themselves of anxiety. The cost of visits to physicians and utilization of health care in general by individuals with anxiety disorders, are double compared to those without anxiety disorders, even if the later is physically ill [3]. Anxiety has become a significant area of psychopharmacological research during this decade, as it affects around one-eighth of the total population of the world. One of the most important medicinal plants is *Datura stramonium* (thorn apple), which is an annual plant belongs to the family of Solanaceae. *Datura stramonium* is an important medicinal plant as it is a well known source of different phytochemicals, it is distributed throughout most of the part of the world. This plant is rich in alkaloids which induce a stimulation of central nervous system and depression of the peripheral nerves typical for parasympathetic. Its medical effects characteristics include spasmolytic, antispasmodic, anticholenergic and narcotic [4, 5]. The present study aimed to evaluate the anti-anxiety activity of ethanolic extract of *Datura stramonium* (leaves) in Swiss albino mice as favorable characters to formulate and prepare anti- anxiety drug.

The plant material *Datura stramonium* (leaves) was collected from local area of Bhopal (M.P.) in the month of Jan, 2018. *Datura stramonium* (leaves) was shade dried at room temperature. The shade dried plant material was coarsely powdered and subjected to extraction with petroleum ether by maceration. The extraction was continued till the defatting of the material had taken place. Dried powdered *Datura stramonium* (leaves) was extracted with ethanol as solvent using cold maceration process for 96 hrs, filtered and dried using vaccum evaporator at 40 °C.

Healthy Swiss albino mice weighing 20-40 g of either sex, aging 3-4 months was included in the study. Pregnant and diseased animals and animals used in other experiments were excluded from the study. Animals were provided free access to water and commercial food and were maintained under standard laboratory conditions with a natural light and dark cycle, under room temperature. The experiment was conducted 30 min after administrating the drug. The experimental study was approved by the Institutional Animal Ethics Committee. Elevated plus maze test consists of a central platform of 10 cm × 10 cm connected to two open arms of 50x10 cms and two closed arms of 50 cm × 40 cm × 10 cm in dimension and elevated 50 cm above the floor. Wistar albino rats weighing 20-40 g was treated with simple saline (Control), reference standard (Diazepam 1 mg/kg) and

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ethanolic extract of leaves of *Datura stramonium* (100 and 200 mg/kg), 30 min before being placed individually in the center of the elevated plus maze, facing a closed arm. The time spent in both open and closed arms was recorded for 5 min. The time spent was measured in seconds. The numbers of entries into the open and closed arms were counted during the test. An entry was defined as having all four paws within the arm [6].

Table 1: Effect of ethanolic extract of leaves of *Datura stramonium* in elevated plus maze

S. No.	Treatment group	% open arm entries	% time spent in open arm
1.	Control	11.33±1.13	7.5±0.66
2.	Diazepam 1 mg/kg	65.71±0.57***	68.83±0.40***
3.	Ethanolic extract of leaves of *Datura stramonium* in the dose of 100 mg/kg	39.45±0.51***	45.63±0.62***
4.	Ethanolic extract of leaves of *Datura stramonium* in the dose of 200 mg/kg	49.18±0.8***	55.40±0.38***

All values are expressed as Mean±SEM(n=6). One way ANOVA followed by Dunnet's test. *** P< 0.001 when compared to control.

The result with ethanolic extract of leaves of *Datura stramonium* in the dose of 200 mg/kg was highly significant when compared to control as shown in table 1. In the present study, Wistar albino rats treated with ethanolic extract of leaves of *Datura stramonium* at the doses of 200 mg/kg produced significant (P< 0.001) anxiolytic effects. In the elevated plus maze test when compared to control as evidenced by increased percentages of both open arm entries and time spent in open arms when compared to control group of animals.

The elevated plus maze is considered to be an etiologically valid animal model of anxiety. In the elevated plus maze, the open arms are more fear provoking than the closed arms. The reduction in entry and time spent in open arms are the indications of the high level of fear or anxiety. The number of entries and time spent in the open arms have been found to be increased by anxiolytics and reduced by anxiogenic agents [7]. A significant increase in the time spent in open arms was observed after treatment with ethanolic extract of leaves of *Datura stramonium* (100 and 200 mg/kg). A significant increase in both time spent in open arms and the entry into open arms is observed after treatment with 100 and 200 mg/kg of ethanolic extract of leaves of *Datura stramonium* suggesting anxiolytic activity. The results obtained in this study suggest that the ethanolic extract of leaves of *Datura stramonium* possesses anxiolytic activity. Thus, ethanolic extract of leaves of *Datura stramonium* has potential clinical application in the management of anxiety disorders. Further investigation of the mechanism/ mechanisms of action of the plant extract, as well as the active substance/substances responsible for its biological actions, is necessary.

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