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EVALUATION OF NOOTROPIC ACTIVITY OF LEAF EXTRACT OF *TYPHA ANGUSTATA*

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ABSTRACT

Alzheimer's disease is a progressive neurodegenerative disorder which effects older individuals and is the most common cause of dementia. Deficiency of acetyl choline and deposition of β- amyloid protein in the form of senile plagues, formation of Neurofibrillary tangles in brain leads to Alzheimer's disease. Glutamate (NMDA) antagonist and choline esterase inhibitors like Donepezil, Glutamine, Rivastigmine and nootropic agents like Piracetam and Aniracetam are being used for improving the memory, mood and behavior but presence of side effects usage is limited. The present study was undertaken to investigate the nootropic activity of the leaves of *Typha angustata* in mice by using Y- maze. Methanolic and aqueous extracts of the *Typha angustata* are (200 mg/kg, i.p) administered for five successive days to the mice. Piracetam (200mg/ kg, i.p) was used as a standard nootropic agent. Diazepam (1mg/kg, i.p) as an amnesic agent. Methanolic extract of *Typha angustata* was shown significant nootropic activity (Decreased in errors in Y-maze model) when compared to the other treatment groups. The results indicate that methanolic extract of *Typha angustata* might prove to be useful in Alzheimer's disease.

Key Words: *Typha angustata*, Nootropic activity, Y-maze model.

INTRODUCTION

Alzheimer's disease is a progressive neurodegenerative brain disorder. It is the most common cause of dementia. This disorder primarily affects the memory, capacity to solve the problems of day to day living, performance of learned motor skills, suicidal skills and controlling of emotions. The central cholinergic system is important to play important role in learning and memory process [1]. The centrally acting anti- muscarinic drugs like scopolamine impairs learning and memory in rodents and human beings [2]. Benzodiazepine receptors agonists such as diazepam and alprazolam have shown to produce amnesia in rodents [3]. Glutamate (NMDA) antagonist like Memantine [4] improves learning and memory by blocking the excitotoxicity of the transmitter glutamate in a non-competitive manner. Nootropic agents like Piracetam [5] and Aniracetam [6] and Cholinesterase inhibitors like Donepezil [7] are most widely used drugs in the treatment of Alzheimer's disease. However the resulting side effects associated with these agents have limited their use [8]. Indian system of medicine emphasizes use of herbs, nutraceuticals for controlling age related neurodegenerative disorders. Plants like *Ocimum sanctum* [9], *Tragia plukenetii* [10], *Rose alba* [11], *Azadirachta indica* [12], *Withania somnifera* [13], *Celastrus paniculatus* [14] and *Moringa olefera* [15] have been investigated for their nootropic functions. *Typha angustata* is belongs to family called Typhaceae. It is a perennial plant breeding in shallow water of a pond or a river side. The height is 1.5- 2cm, and its leaf and stem are standing straightly. Its leaf is thick and has 5-12 mm thickness. *Typha angustata* is the most popular medicinal plant used for various medicinal properties and reported in many traditional literatures in India, as well as in China and Turkey. The leaves are used as diuretic [16]. The pollen is Astringent, Desiccant, Diuretic, Haemostatic and Vulnerans [17]. It is used in the treatment of nose bleeds, Haematemesis, Haematuria, Uterine, Bleeding, Dysmenorrheal, Post-Partum Abdominal Pain and Gastralgia, Scrofula and Abscesses [17]. The root stock is astringent and diuretic [18].It is contraindicated for pregnant women [16].The seed down is Haemostatic [16]. It is used for inducing labor. It is used in acute experimental Myocardial Infarction in rabbits. The extract of the pollen from *Typha angustata* has ability to enhance

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the osteoinductive potential of demineralized bone matrix [19]. *Typha angustata* used in the study of acid mine water of wetlands [20]. It is used as Anti-Inflammatory agent [21]. *Typha angustata* contains Naringenin which inhibits the vascular smooth muscles cell proliferation so that used as therapeutic agent in controlling of vascular problems [22]. Due to presence Anti-Oxidants like Flavonoids [23].

Typha angustata activated carbon can be successfully employed as low cost alternative to the commercial adsorbents in the removal of fluoride ion from wastewaters [24].

Typha angustata is widely used as biomass, fiber, insulation, and miscellany, paper, soil stabilization, stuffing, thatching and weaning [25].The stems and leaves have many uses, they make a good thatch, can be used in making paper, can be woven into mats, chairs, hats [26].They are a good source of Biomass, making an excellent addition to the compost heap or used as a source of fanatic. A fiber obtained from the roots can be used to make strings [22]. The hairs of the fruits are used for stuffing pillow etc. They have food insulating and buoyancy properties. The pollen is highly inflammable and is used in making fireworks. This plants extensive root system makes it very good for stabilizing wet banks of rivers, lakes.

MATERIAL AND METHODS

Preparation of extract

Shade dried leaves of *Typha angustata* (Typhaceae) collected locally was authenticated and extracted with methanol through soxhalation and aqueous extract by maceration method.

Animals

Swiss albino mice of either sex (25-30g) were maintained for the 5 days in the animal house of the Chalapathi Institute of Pharmaceutical Sciences, Guntur under standard conditions of the temperature (24± 10c), relative humidity (45-55%) and 12:12 light: dark cycle. the animals had free access to food and water. Four mice per group were used in all set of experiments. All the experiments were conducted after obtaining the permission from Institutional Animal Ethics committee (IAEC). Care of animals was taken as per guidelines of CPCSEA, Dept. of Animal Welfare, and Govt. of India.

Drugs

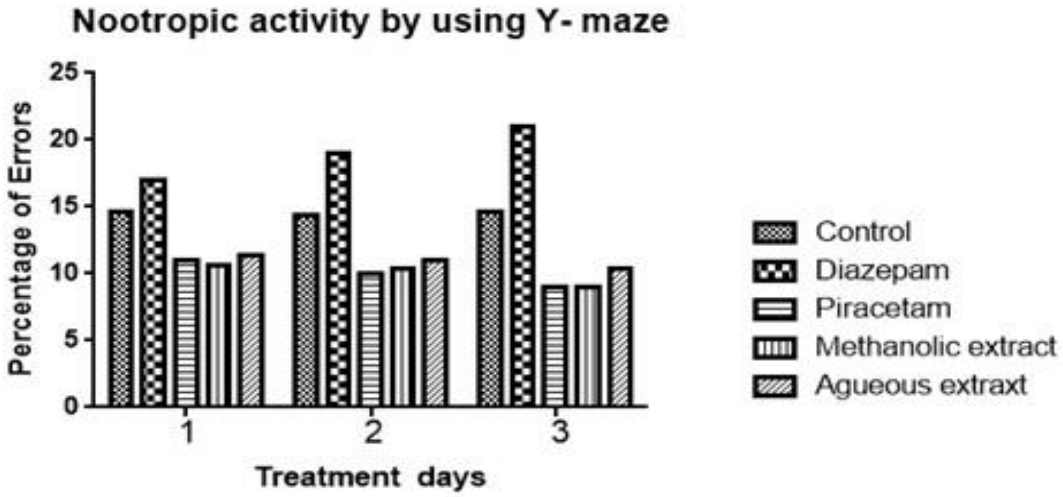
Drugs like Piracetam (UCB India Pvt. Ltd), Diazepam (Ranbaxy, India) were used in the present study.

Selection of dose

The test animals were randomly chosen and divided into the five groups as follows:
Group -1- Control group (0.9% normal saline 5ml/kg, i.p),
Group-2- Standard (Piracetam 200mg/ kg, i.p),
Group-3- Diazepam (1mg/kg, i.p),
Group-4- Methanolic extract (200mg/ kg, i.p),
Group-5 - Aqueous extract (200mg/ kg, i.p).

Statistical analysis

The values are expressed as Mean ± SEM. The results were analyzed for statistical significance using one way ANOVA followed by multiple comparisons by Dunnett's test.



One Way ANOVA was followed by Dunnett's multiple comparisons test

Control	vs. Piracetam	P < 0.01
Control	vs. Methanolic extract	P < 0.01
Control	vs. Agueous extraxt	P < 0.01

MODEL FOR NOOTROPIC ACTIVITY

Spatial discrimination by using Y- maze

In the simplest case of discrimination learning the animal distinguishes between two symmetric stimulus response sets, the equal probability of which has been changes by differential reinforcement events. Mice of both sexes are used and maintained under standard conditions. The apparatus used is usually a simple Y-maze [27], [28], with an electrifiable grid floor. The last 10 cm of each arm are separated from the rest of the apparatus by a swing-door which prevents the animal from seeing the food cup or the plastic sheet covering the grid in the goal area. A fixed resistance shock source is connected to an automatically operated switch. In an aversively motivated spatial discrimination learning the animal is trained to escape and/or to avoid foot shocks by always going to the right .Training starts by allowing the animal to explore the apparatus. Then the animal is placed on the start and after 5 s electric shocks (0.5 s, 50 Hz, 1.0 mA) are applied at 3 s intervals. They are trained to a criterion. On the following day the animal is retrained to the same criterion. After a 60 min interval the safe goal area is shifted to the other arm of the maze and the discrimination is reversed. Observe the number of errors and are scored. An error means that the animal enters the wrong arm with all four legs. During retention the numbers of trials until the animal makes correct choices are counted.

CONCLUSION

In the present investigation, *Typha angustata* has shown significant Nootropic activity in mice when compared to other treatment groups.

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