EVALUATION OF MEMORY ENHANCEMENT ACTIVITY OF LEAF EXTRACT OF _TYPHA ANGUSTATA_ 
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**ABSTRACT**

Alzheimer’s disease is a progressive neurodegenerative disorder which affects 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 memory enhancement activity of the leaves of _Typha angustata_ in mice by using the Elevated plus 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 memory enhancement agent. Diazepam (1mg/kg, i.p) as an amnesic agent. Methanolic extract of _Typha angustata_ was shown significant memory enhancing activity. (Decreased transverse latency) 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_, Memory Enhancement Activity, Elevated Plus Maze.

**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 play an important role in learning and memory process (Higashida A, Ogawa N, 1987). The centrally acting anti- muscarinic drugs like scopolamine impairs learning and memory in rodents and human beings (Satyavati GV, 1995). Benzodiazepine receptor agonists such as diazepam and alprazolam have shown to produce amnesia in rodents (Preston C et al., 1989). Glutamate (NMDA) antagonist like Memantine (Katzman R, Kawas C, 1998) improves learning and memory by blocking the excitotoxicity of the transmitter glutamate in a non-competitive manner. Nootropic agents like Piracetam (Cumin R et al., 1982) and Aniracetam ([Blazer DG et al., 1983) and Cholinesterase inhibitors like Donepezil (Rogers SH et al., 1998) 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 (Nabeshima T, 1993). Indian system of medicine emphasizes use of herbs, nutraceuticals for controlling age related neurodegenerative disorders. Plants like _Ocimum sanctum_ (Kirtikar KR, Basu BD, 1991), _Tragia plukenetii_ (Sathish Kumar M et al., 2013), _Rose alba_ (Nilofar SN et al., 2009), _Azadirachta indica_ (Jaiswal AK et al., 1994), _Withania somnifera_ (Bhattacharya K et al., 1995), _Celastrus paniculatus_ (Bhanumathy M et al., 2010) and _Moringa olefera_ (Mohan M et al., 2005) have been investigated for their nootropic functions. _Typha angustata_ belongs to family 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 straighly. 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 (Duke JA and Ayensu ES, 1985). The pollen is Astringent, Desiccant, Diuretic, Haemostatic and Vulnerans (Yeng Him-Che, 1985). It is used in the treatment of nose bleeds, Haematemesis, Haematuria, Uterine, Bleeding, Dysmenorrheal, Post-Partum Abdominal Pain and Gastralgia, Scrofula and Abscesses. The root stock is astringent and diuretic (Chopra RN et al., 1986). It is contraindicated for pregnant women. The seed down is Haemostatic. 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 the osteoinductive potential of demineralized bone matrix. *Typha angustata* used in the study of acid mine water of wetlands (Sheoran AS et al., 2006). It is used as Anti-Inflammatory agent (Jung-Jin L et al., 2012). *Typha angustata* contains Naringenin which inhibits the vascular smooth muscles cell proliferation so that used as therapeutic agent in controlling of vascular problems. Due to presence of Anti-Oxidants like Flavonoids (Kolhe VN et al., 2011). *Typha angustata* activated carbon can be successfully employed as low cost alternative to the commercial adsorbents in the removal of fluoride ion from wastewaters (Hanumantharao Y et al., 2012).

*Typha angustata* is widely used as biomass, fiber, insulation, and miscellany, paper, soil stabilization, stuffing, thatching and weaning (Singh G and Kachroo P, 1976). 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 (Moerman D, 1998). 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 (Itoh J et al., 1990). 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 5 days in the animal house of 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 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.

**Model for Memory enhancement activity: Elevated plus maze**

Mice were placed individually at the end of open arm facing away from the central platform and the time it took to move from open arm to either of the closed arm (Transfer latency, TL) was recorded (27). On the first day, the mouse was allowed to explore the plus maze after the measurement of transfer latency. TL measured on the first and second day served as parameters for acquisition and retrieval respectively. All the drugs were administered 30 min before the first trial.

**Fig 1. Evaluation of nootropic activity**

One way ANOVA followed by Dunnett’s multiple comparison test for Elevated plus maze Control vs Diazepam p < 0.001, Control vs Piracetam p <0.001, Control vs Methanol extract P<0.001, Control vs Aqueous extract P <0.01.
CONCLUSION

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

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