



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 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 plaques, 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 straightly. Its leaf is thick and has 5-12 mm thickness. *Typha angustata* is

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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).

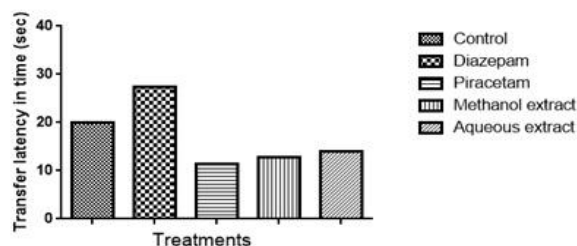
Statistical analysis

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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REFERENCES

- Bhanumathy M *et al.*, Nootropic activity of *Celastrus paniculatus* seed. *Pharmaceutical biology*, 48(3), 2010, 324-327.
- Bhattacharya K, Kumar A, Ghosal S. Effects of glycol withanolides from *Withania somnifera* on an animal model of Alzheimer's disease and perturbate cholinergic markers of cognition in rats. *Phytother Res*, 9(1), 1995, 10-3.
- Blazer DG, Federspiel CF, Ray WA, Schaffner W. The risk of anticholinergic toxicity in the elderly: A study of prescribing practices in two populations. *J Gerontol*, 38, 1983, 31-35.
- Chopra RN, Nayar SL and Chopra IC. Glossary of Indian Medicinal Plants Council of Scientific and Industrial Research, New Delhi, 1986.
- Cumin R, Bandle EF, Gamzu E, Haefely EW. Effects of the novel compound aniracetam (Ro-13-5057) upon impaired learning and memory in rodents. *Psychopharmacology*, 78, 1982, 104-111.
- Duke JA and Ayensu ES. 1985, ISBN 1-917256-20-4.
- Hanumantharao Y *et al.*, Characterization and Defluoridation Studies of Active Carbon Derived from *Typha Angustata* Plants. *Journal of analytical science & Technology*, 3(2), 2012, 167-181.
- Higashida A, Ogawa N. Differences in the acquisition process and the effect of scopolamine on radial maze performance in the strains of rats. *Pharmacology BiochemBehav*, 27, 1987, 483-489.
- Itoh J, Nabeshima T, Kameyana T. *Psychopharmacol*, 101, 1990, 27-33.
- Jaiswal AK, Bhattacharya SK, Acharya SB. Anxiolytic activity of *Azadirachta Indica* leaf extract in rats. *Indian J ExpBiol*, 32, 1994, 489-91.
- Jung-Jin L *et al.* *Journal of Ethno pharmacology*, 139(3), 2012, 873-878.
- Katzman R, Kawas C. Risk factors for Alzheimer's disease. *Neuro Science News*, 1998, 27-44.
- Kirtikar KR, Basu BD. *Indian Medicinal Plants*. 2nd ed. Delhi: Periodicals Experts Book Agency. 1991, 982-983.
- Kolhe VN *et al.*, Anti- inflammatory activity of *Typha angustata*. *International journal of research in Ayurveda and pharmacy*, 2(5), 2011, 1598-1600.
- Kolhe VN *et al.*, Anti- inflammatory activity of *Typha angustata*. *International journal of research in Ayurveda and pharmacy*, 2(5), 2011, 1598-1600
- Moerman D. *Native American Ethnobotany* Timber press. Oregon, 1998, ISBN 0-88192-453-9.
- Mohan M *et al.*, Nootropic Activity of *Moringa oleifera* Leaves. *Journal of natural remedies*, 5(1), 2005, 59-62.
- Nabeshima T. Behavioral aspects of cholinergic transmission: Role of basal forebrain cholinergic system in learning and memory. *Progr Brain Res*, 98, 1993, 405-11.
- Nilofar SN *et al.*, Memory-enhancing activity of *Rose alba* in mice. *International journal of green pharmacy*, 3(3), 2009, 239-242.
- Preston C, Ward C, Lines CR, Poppleton P, Haigh JR and Traud M. Scopolamine and benzodiazepine models of dementia-reversal by Ro-15-1788 and physostigmine. *Psycho pharmacology (Berl)*, 98, 1989, 487-494.
- Rogers SH, Farlow MR, Doody RS, Mohs R, Friedhoff LI. A 24-week, double blind, Placebo-controlled trial of Donepezil in patients with Alzheimer's disease. *Neurology*, 50, 1998, 136-145.
- Sathish Kumar M *et al.*, Effect of *Tragia plukenetii* R-Smith Leaf Extracts on Learning, Memory and Reasoning Using Hebb's William Maze. *Research journal of pharmaceutical, biological and chemical sciences*, 4(2), 2013, 1363
- Satyavati GV. Leads from Ayurveda from medicinal plants acting on the nervous system. *Decade of the brain, USA: U.S. Department of Health and Services*, 1995, 185-189.
- Sheoran AS *et al.*, Study of acid mine water of wetlands with emergent macrophyte *Typha angustata*, *International journal of Mining, Reclamation and Environment*, 20 (3), 2006, 209-222.
- Singh G and Kachroo P. *Forest flora of Srinagar*. Bishen Singh Mahindra pai Singh. 1976.
- Yeng Him-Che. *Hand book of Chinese Herbs and Formulas*. Institute Of Chinese Medicine, Los Angles, 1985.