ABSTRACT

Background and objective:

Nootropic agents are widely used to improve memory. The present study was undertaken to evaluate the nootropic efficacy of *essential oil of Cymbopogon Citratus* & *Nepeta cataria* on learning and memory employing Exteroceptive and Interoceptive behavioral models in young and aged mice. The study was planned to identify potential of naturally occurring two herbal which are used widely in the form of tea in many parts of the world due to its good flavor and high therapuetic property. In our study the extracted essential oil of *Cymbopogon Citratus* & *Nepeta cataria* were used for treatment of dementia in various experimental animal models which included mice and rats. Essential oils of cymbopogon citrates and nepeta cataria are being extensively used by majority of the population in the diet. The very important benificitaory use of these essential oils is in making herbal tea. The teas are consumed by all age population, in India the herbal tea is consumed form major proportion of population commonly called as lemon tea for their cool and tension relieving property and also improves the mood.

Methods:

Extraction of essential oils was carried out by hydro distillation; oral acute toxicity of essential oils was determined by using albino mice of either sex (20-25 g), The essential oils were administered orally different doses. Mortality was nil and was found to be safe
at the given all doses. All the test drug doses were prepared using distilled water and 5% Tween 80 solution (suspending agent). Essential oil of Cymbopogon Citratus & Nepeta cataria (1gm/kg, p.o.) was administered to young and aged swiss albino mice and investigated for the, Nootropic activity transfer latency (short term memory), TSTQ (long term memory), passive avoidance response model, locomotor activity by using actophotometer & whole brain acetylcholiesterase activity, MAO inhibitory action, clonidine induced catalepsy and methyl dopa induced hypothermia to check behavioural chage. Piracetam (200 mg/kg, i.p.) was used as a standard nootropic agent.

**Results:**

LD$_{50}$ (acute oral toxicity) of essential oils of *Cymbopogon Citratus* & *Nepeta cataria* was determined in mice with a dose above 2gm/kg body weight not shown any toxic response. Hence 1gm /kg body weight the experimental doses selected. Behavior parameters were checked with both essential oils to checked marked changes that can occur upon the administration of the oils with the animals to check this different parameters were checked which includes, Alert, Posture, Reaction on touch, Reaction to light Righting reflex, Lacremal secretion, vocalization, sign of depression, Food intake, Fur in skin were observed when the animals were administered with essential oils upon observation all the animals shown normal in their behavioral response indicating that the essential oils are not having their role in the changes of the behavior in the animals. There by interference with the values of the result can be avoided.

Both essential oil produced significant reduction in transfer latency and escape latency in EPM and MWM respectively on both first and second days when compared with control. EPM , Y-maze and MWM are widely used exteroceptive behavior models used by neuro-pharmacologists to check short term memory and long term memory respectively. in our study we observe that TLT become very much short because it was previously exposed with all arems of EPM, so decrease TLT is related to memory processes.

In EPM, TLT were checked as a parameter on first day ie on the eighth day of the administration of the essential oil and the retention/ consolidation (memory) is examined twenty four hour later that is on ninth day. The animal shows shortening in TLT on day 2
when comparing with control group, shows improvement in cognitive action because of administration of Essential oils of Cymbopogon Citratus & Nepeta cattaria (1gm/kg) and Piracetam (200mg/kg) in mice.

In Passive avoidance response model, essential oils of *Cymbopogon Citratus* & *Nepeta cattaria* (1gm/kg) and Piracetam (200mg/kg) when given along with scopolamine (1mg/kg) significantly reversed scopolamine-induced impairment both on acquisition and retention. A protection was observed with all the parameters tested i.e latency to reach shock free zone (SFZ) and step-down error (SDE) in 15 min.

The essential oil central nervous system action was screened by using activity cage where, the essential oils administered groups failed to show any significant reduction or increase in the locomotor activity as compared to the control group. These results suggesting that the essential oils showed its action not by either stimulating or depressing the central nervous system, but by showing its action on other mechanisms which are involved in the pathogenesis of the AD.

In open field test essential oils failed to show any significant reduction in locomotor activity as compared to control, many drugs acting on CNS effect locomotor activity literature also demonstrated that drugs that alter general motor activity may give false-positive/negative results. Inhibitory action on monoamino transference, interferes with methyl dopa induced hypothermia and precipitate catalepsy.

Halopiredol induced catalepsy model is a behavioural model, the behavior of animals is regulated by neurotransmitters especially dopamine. Herer halopiredol used can block the receptors of dopamine binding site where by it can block of the actions which are mediated through dopamine. In animals after administration of this drug it can cause a state of immobility in them it is considered as a catalepsy stage.

*Cymbopogon Citratus* & *Nepeta cattaria* inhibited MAO activity in both young and aged. Piracetam (200mg/kg, i.p.). It is also supported by observing the datas obtained in clonidine induced hypothermia model in rats group treated with EOCC/EONC fails to produce hypothermia. It is the basic physiology of nor adrenaline which can cause hyperthermia the EOCC & EONC most probably caused failed in hypothermia is due to
inhibition of noradrenaline metabolism by inhibiting MAO. The data also suggested that both EOCC & EONC posses MAO inhibitory activity.

Cholinesterase inhibitors (ChEI), which enhance cholinergic function, are the currently used option in the treatment of AD. They are the only available standard pharmacologic treatment option for patients with mild to moderate AD. anticholinesterase inhibitor which can increase the acetyl choline level in nerve terminals in the regions of brain by preventing its degradation. *Cymbopogon Citratus* & *Nepeta cataria* shown positive results i.e inhibited AChE activity in both young and aged same was also observed with Piracetam (200mg/kg, i.p.) but piracetam cannot block the enzyme engaged with the hydrolysis but it can show its action by using other mechanism.

_Cymbopogon Citratus* & _Nepeta cataria_ shown inhibition and promisingly role in the lowering of AChE activity in both young animal group as well as on the aged group animals also. Piracetam a marketed drug in different brands are having the same action in both group in the study it was used as standard drug

**Conclusion:**

The present findings suggest that *essential oil of Cymbopogon Citratus* &
Nepeta cataria which contains cyclic monoterpenes as the most active compounds has neuroprotective, nootropic and anti acetyl cholinesterase activity. Hence it can be employed in enhancing the memory of Alzheimer’s disease. The results of the present study concludes that, the essential oils of Cymbopogon Citratus & Nepeta cataria possesses significant nootropic activity in experimental animal models of amnesia. This could be due to the presence of various traces of active principles which are found to be present in the essential oils like presence of cyclic monoterpenes as the most active compounds.

However, further studies are required to elucidate its mechanism of action and to isolate and characterize the phytoconstituents responsible for the activity.

**Keywords:**

*Essential oil, Cymbopogon Citratus & Nepeta cataria, Acetylcholine, Learning, Memory, Nootropic, Neurotransmitters, Piracetam, Scopolamine.*