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Acanthus ilicifolius, A saline plant of southeast coast as CNS depressant

J Noorul Jashmi[1*], S Karpagam Kumara Sundari[2], KAS Mohamed Shafeeq[3]

[1] Student, Department of Pharmacology, Periyar College of Pharmaceutical Sciences, Tiruchirappalli, Tamil Nadu, India

[2] Professor, Head, Department of Pharmacology, Periyar College of Pharmaceutical Sciences, Tiruchirappalli, Tamil Nadu, India

[3] Associate Professor, Department of Pharmacology, Periyar College of Pharmaceutical Sciences, Tiruchirappalli, Tamil Nadu, India

Abstract
Herbal medicine or phytomedicine is the use of plants for medicinal and therapeutic purpose for curing of diseases and improve human health. Plants have secondary metabolites called phytochemicals. Phytochemicals are active ingredients which possess therapeutic properties that are considered as a medicine or drug. Mangrove plants tends to establish that they may be a source of novel compounds along with providing a new source for many already known biologically active compounds. From the literature scanning *Acanthus ilicifolius,* a mangrove plant has been used for *in vitro* evaluation of CNS depressant. Different classes of CNS depressant works in different ways, but all have the ability to reduce activity in the Central Nervous System and lower levels awareness in the brain. Mostly CNS depressants used in the conditions of Insomnia, Anxiety, Epilepsy etc. One of the common pathological factor involved to cause those disorder is GABA (Gamma Amino Butyric acid). The evaluation of potential CNS depressant activity of the crude extract from the saline plant was accomplished by using well established GAB Aergic bioassay.

Keywords: mangrove plant, *Acanthus ilicifolius,* CNS depressant, GABA

Introduction
Mangrove plant extracts have been used for centuries to treat health disorders. Plant – derived substances have recently become great interest owing to their versatile application [1]. *Acanthus ilicifolius* Linn. (Acanthaceae) found with mangroves along the coastal regions of India. Different parts of the plant have been used in the traditional system of medicine as a nervine sedative, astringent, expectorant, anti-inflammatory, antinociceptive [2]. Insomnia results due to an imbalance between sleep inducing neurotransmitters gamma - aminobutyric acid (GABA) and adenosine present in the ventrolateral preoptic nucleus in the hypothalamus and the arousal neurotransmitter (noradrenaline, serotonin, acetylcholine, arexin and dopamine) [3]. The neurotransmitters primarily implicated in anxiety are GABA, serotonin (5-HT) and noradrenaline. Dysregulations in the noradrenergic systems are hypothesized to occur in anxiety disorders. Noradrenaline modulates autonomic arousal mechanisms, including increased heart rate and respiration. This leads to a physiological cascade resulting in panic symptoms such as paraesthesia, numbness and tightness in the chest [4]. The biological activity was assessed using bioassay targeting most important aspects of the GAB Aergic systems.

Materials and Methods
Plant material
Acanthus ilicifolius Linn. (Acanthaceae) were collected from pichavaram, Tamilnadu, India and were shade dried pulverized into the coarse powder and subjected to defatting with petroleum ether and then extracted with ethanol using Soxhlet apparatus.

Method
The ability of plant extracts to inhibit GABA-T was evaluated using our validated and previously described spectrophotometric method. The Plant extract at different concentration was evaluated followed by GABA T treatment (chick brain extract). The reaction mixture contain 100mM/L potassium pyrophosphate, 5mM/L α-ketoglutarate, 4mM/L Nicotinamide Adenine Dinucleotide, 3.5mM/L 2-mercaptoethanol, 10µM/L pyridoxal - 50 –phosphate and adjusted upto pH 8.6. 0.5 mL of reaction mixture mixed with 0.5 ml sample pretreated enzyme. Untreated enzyme was used as control. Amount of NADH produced recorded at 304nm [5].

Results and Discussion
Test extracts at 100µg decreases the level of NADH at 0.23µm shown in Table No. 1 (NADH – byproduct obtained from the metabolism of GABA). These observation allow us to assess the available concentration of GABA which is responsible for CNS depressant activity by identifying the level of GABA-T enzyme. No inhibition of enzyme in untreated sample shows that no presence of GABA with increasing the concentration of GABA metabolising enzyme (GABA-T).

Table 1: GABA transaminase activity assay of *Acanthus ilicifolius* (R^2= 0.99)

S. No	Conc. of Sample µg	µM of NADH	Conc. of Standard Mg	µM of NADH
1.	10	1.406293	25	0.262626
2.	25	0.537374	50	0.229293
3.	50	0.411111	75	0.219293
4.	100	0.230293	100	0.215152

Untreated = 1.8µM of NADH is produced

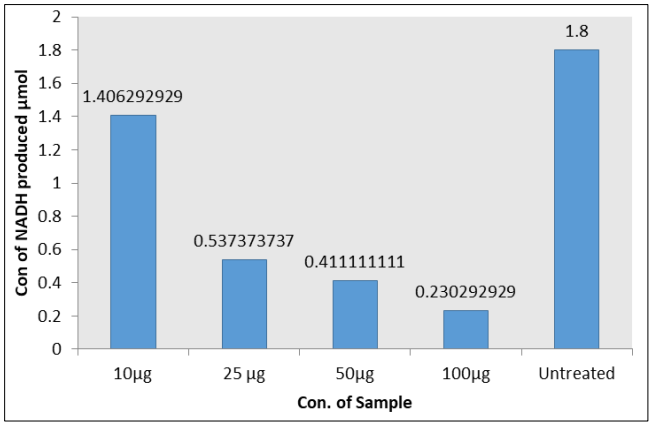

Fig 1: Concentration of NADH produced by sample treated GABAT

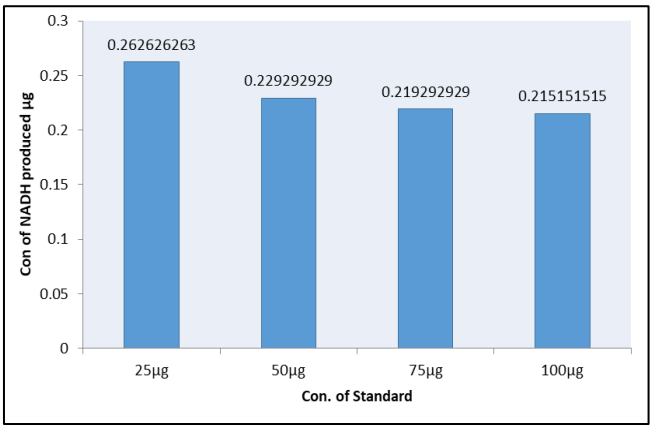

Fig 2: Concentration of NADH produced by standard treated GABAT

Conclusion

In vitro assay study, to gain a better understanding of GABA, an enzyme GABA-T inhibition assay were performed. Action of test extracts could therapeutically achieve a GABA mimetic/minergic response (either to stimulate their synthesis/release or to inhibiting the GABA metabolism). The present data shows that Ethanolic Extracts of Leaves of *Acanthus ilicifolius* (saline plant) possess activity on GAB Aergic system by interacting with GABA-T (Fig. No.1 and 2) Results in increasing the brain GABA levels by inhibition of GABA-T mediated metabolism.

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