

Attenuation of depressant activity by ethanol extract of seeds of areca catechu in swiss albino mice after deca - days administration

Srinivas Bhat U^{1,*}, Mohandas Rai², Sharath Kumar K³, Rashmi R Rao⁴, Chandrashekar R⁵

^{1,3,5}Assistant Professor, ²HOD, AJ Institute of Medical Science & Research Centre, Karnataka, ⁴Assistant Professor, Dept. of Pharmacology, Kasturba Medical College, Manipal University, Karnataka

***Corresponding Author:**

Email: drsrinivasbhat@gmail.com

Abstract

Depression is the loss of ability to enjoy life and experience pleasure. The symptoms are constant, ranging from moderate to severe. If untreated, major depression typically lasts for about six months. Some people experience just a single depressive episode in life. The objective of the present study was to evaluate attenuation of depressant activity by Ethanolic extract of seeds of *Areca catechu* in Swiss Albino mice after deca day's administration. Animals were randomly allocated into five groups comprising six animals in each. Group I was treated with normal saline (0.1 ml/10 g) which served as control. Group II was treated with Imipramine at the dose of 10 mg/kg which served as standard. Groups II, IV and V were treated with three different doses (40, 80, and 160 mg/kg) of Ethanolic extract of seeds of *Areca catechu*. All the drugs were given intraperitoneally (0.1 ml/10 g) daily for 9 days and 30min before the experiment on the 10th day. Ethanolic extract of seeds of *Areca catechu* has shown significant antidepressant activity at all the doses but more evident at the dose of 80mg/kg which was comparable with Imipramine 10mg/kg by forced swim test and tail suspension test.

Keywords: *Areca catechu*, Attenuation, Depression, Ethanolic extract

Access this article online

Website:

www.innovativepublication.com

DOI:

10.5958/2393-9087.2016.00029.7

Introduction

Mood disorders and its effects have been described since the 4th century BC. Despite this early acknowledgment, their etiology is still a source of debate. There is a growing knowledge that, far from being a disease with purely psychological disorder and the diagnosis of depression is based on a heterogeneous set of symptoms¹. These criteria have gradually developed based on documentation by both the American Psychiatric Association (APA) and the World Health Organization (WHO) Geneva providing essential guidance for both clinicians and researchers².

An episode of depression may be characterized by sadness, difference in surroundings, apathy, or irritability and is usually associated with alterations in sleep patterns, appetite, weight, motor agitation or retardation, fatigue, impaired concentration and thoughts of death or dying³.

Areca catechu is the areca palm, is a species of palm which is usually grown in India, Malaysia, Taiwan and many other countries for their seeds. Betel nut is placed 4th next to nicotine, ethanol and caffeine, is chewed by millions of people living in east coast of Africa and also the western Pacific⁴.

Areca catechu belongs to the family Arecaceae and

is erroneously called as betel tree due to its fruit, the arecanut is always chewed along with the betel leaf, a leaf from the Piperaceae family. This is a medium sized and graceful palm tree growing straight to 20m tall with a trunk measuring 20-30 cm in diameter. The leaves are 1.5-2m long, pinnate with numerous crowded leaflets. *Areca catechu* is grown for its important seed crop, the areca nut for commercial purposes. The seed contains alkaloids such as arecaine and arecoline. About nine alkaloids together constitute the active ingredients of betel nut, the most abundant of which is arecoline – a potent cholinergic agonist that crosses the blood-brain barrier (BBB) and includes a range of parasympathetic effects^{5,6}. It is known as 'Akota' in Sanskrit and 'Adike' in Kannada. Ethanol extract of *Areca catechu* has been shown to have antidepressant properties⁷. In view of this the present study was undertaken to compare the antidepressant activity of ethanol extract of *Areca catechu* in Swiss albino mice.

Materials and Methods

This study was conducted in the Department of Pharmacology, A.J Institute of Medical Sciences & Research Centre, Mangalore. Institutional Animal Ethical Committee approval was obtained from wide Ref. no IAEC/2009/01 dated 16/10/09 from, A.J Institute of Medical Sciences & Research Centre, Mangalore. Adult Swiss Albino mice of either sex weighing 20-25gms inbred in the central animal house of A.J Institute of Medical Sciences was used for the study. Six Mice were housed in clean polypropylene cages in a controlled environment with a 12 hr light and dark cycle. They were fed with commercial pellet

and provided water ad libitum. The mice were allowed to acclimatize for these conditions for one week.

Drugs and Chemicals

- Ethanolic extract of seeds of *Areca catechu* which was obtained using Soxhlet apparatus and was procured in Srinivas College of Pharmacy.
- Imipramine (Torrent pharmaceuticals) at the dose of 10 mg/kg, intraperitoneally (0.1ml/10g). 25mg tab dissolved in 25 ml of distilled water (1mg /1 ml concentration).

Study Design

For the first phase of the study, animals were divided into five groups, and each group comprised of six mice. Group I (control group) was treated with normal saline (0.1 ml/10 g). Group II was treated with Imipramine at the dose of 10 mg/kg which served as standard. Groups III, IV and V were treated with three different doses (40, 80, and 160 mg/kg) of Ethanolic extract of seeds of *Areca catechu*. All the drugs were given intraperitoneally (0.1 ml/10g). All the drugs were given daily for 9 days and 30min before the experiment on the 10th day.

Forced Swim Test

After 30 minutes of drug administration, mice were

placed individually in the 5L glass beakers, filled to a height of 15 cm with water maintained at room temperature and the duration of immobility is recorded during the last 4 minutes in a 6 minutes test. The animal was considered immobile when it floated motionless or makes only those movements in order to keep its head above water surface. Frequently the water was changed after each test. Antidepressants are known to decrease the immobility time.

Tail Suspension Test

Tail suspension test was conducted after 30 min of drug administration. Mice were suspended on the metal rod stand placed 50-75 cm above the table top by the adhesive tape placed approximately 1 cm measured from the tip of the tail. Immobility time was recorded during 8 min period. Animal was considered to be immobile when it will not show any movement of body and hanged passively. A decrease in the immobility period is indicates antidepressant like activity.

Statistical Analysis

Mean duration of immobility for each group was calculated. The data was expressed as mean±SD. One-way ANOVA followed Dunnett's multiple comparison test. p value less than 0.05 were considered significant.

Results

Table 1: Chronic antidepressant activity of Ethanolic extract of seeds of *Areca catechu* by forced swim test in Swiss albino mice

Groups	Treatment Drug / dose in	Duration of immobility in seconds (mean±SD)
I	Control (normal saline)	92±38.37
I	Imipramine (10 mg/kg)	41.83±5.78***
III	EESA (40 mg/kg)	16.67±5.16***
IV	EESA (80 mg/kg)	40.33±6.80***
V	EESA (160 mg/kg)	25.5±6.41***

Observations: mean±SEM. ***p<0.0001, Highly significant. ANOVA followed by Dunnett's multiple comparison test. EESA- Ethanolic extract of seeds of *Areca catechu*

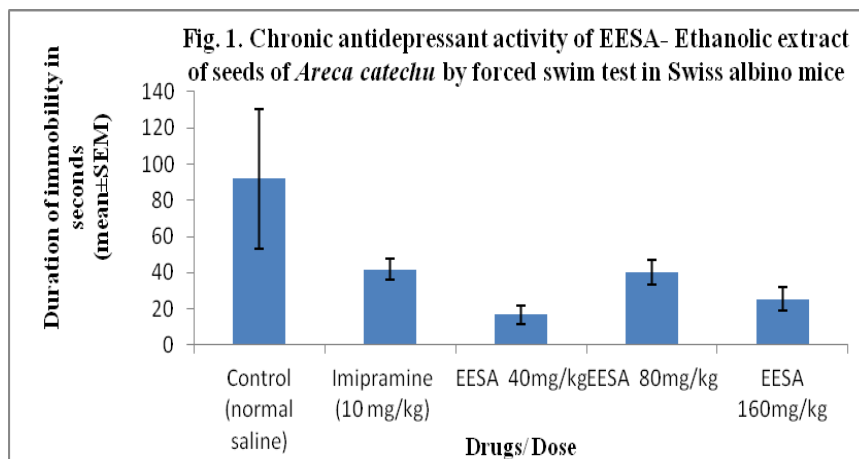


Fig. 1: Chronic antidepressant activity of EESA- Ethanol extract of seeds of *Areca catechu* by forced swim test in Swiss albino mice

EESA- Ethanol extract of seeds of *Areca catechu* by forced swim test in Swiss albino mice

Table 2: Chronic antidepressant activity of Ethanol extract of seeds of *Areca catechu* by tail suspension test in Swiss albino mice

Groups	Treatment Drug / dose in	Duration of immobility in seconds (mean±SD)
I	Control (normal saline)	181.67±20.18
I	Imipramine (10 mg/kg)	103.50±23.01
III	EESA (40 mg/kg)	64±8.44
IV	EESA (80 mg/kg)	121.33±25.88
V	EESA (160 mg/kg)	32.17±11.62

Observations: mean±SEM. ***p<0.0001, Highly significant. ANOVA followed by Dunnett's multiple comparison test

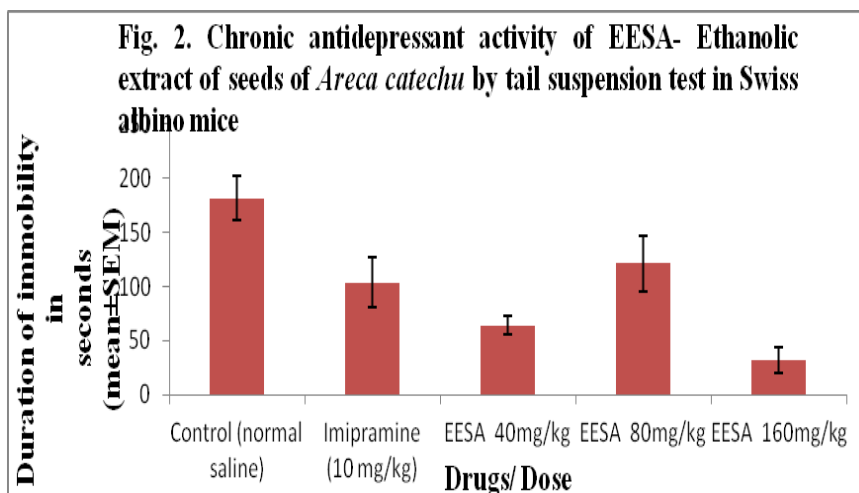


Fig. 2: Chronic antidepressant activity of EESA- Ethanol extract of seeds of *Areca catechu* by tail suspension test in Swiss albino mice

EESA- Ethanol extract of seeds of *Areca catechu* by forced swim test in Swiss albino mice

Discussion

This present study of ours was carried out to evaluate the antidepressant activity of *Areca catechu* in

two different models of depression in animals. Both forced swim test and tail suspension tests were standard animal models, predictive of antidepressant activity.

Since their introduction almost 20 years ago, the tail suspension test and forced swim tests have become the most commonly used models for evaluating antidepressant activity in mice. These models were based on the fact that animals when subjected to the short-term, inescapable stress of being suspended by their tail, will develop an immobile posture. Indeed the sensitivity of these models to a broad range of antidepressants drug is the most important feature supporting its use in drug discovery of antidepressants. Although rodent behavioural models have a good predictive validity for antidepressants and they are sensitive to the acute administration for these compounds, it is widely recognized that the symptoms of depression in patients are only ameliorated after chronic drug treatment. Therefore, we decided to check whether the effects of antidepressants in the forced swim test and tail suspension tests are dependent on the duration of drug treatment. Hence the effect of chronic administration of *Areca catechu* was also evaluated in our study.

The present study conclusively shows that *Areca catechu* has significant antidepressant activity which was comparable with standard antidepressant drug Imipramine. Our results confirm the literature data, by showing that *Areca catechu* reduces the immobility time in both the models used.

The administration of *Areca catechu* produced a decrease in immobility time in both the models, a response that is consistent with an antidepressant like action. In forced swim test model, *Areca catechu* has shown significant antidepressant activity at the dose of 80mg/kg which was comparable with Imipramine 10mg/kg by forced swim test (Table 1 & Fig. 1). Similarly, in the tail suspension model, *Areca catechu* has shown significant antidepressant activity in all the three doses used in our experiments (Table 2 & Fig. 2). The dose dependent antidepressant activity of *Areca catechu* was observed in both the models on chronic administration of the drug.

Conclusion

Results of present study showed that ethanol extract of *Areca catechu* has the definite antidepressant effect. It significantly reduces immobility time in both forced swim test and tail suspension test with better results during chronic drug administration.

Acknowledgement

We are thankful to Dr. Mohandas Rai, Prof & HOD, Department of Pharmacology, A.J. Institute of Medical Sciences and Research Centre, Mangalore for providing support to conduct this research in the department.

References

1. American psychiatric association. Diagnostic and Statistical Manual of Mental Disorders, DSM-IV. Fourth

- edition (text revision). Washington DC: American psychiatric association; 1994 (2000):345-428.
2. World health organization. The ICD-10 Classification of mental and behavioural disorders. Clinical descriptions and diagnostic guidelines. ICD-10 ed. Geneva: World health organization; 1992:99-109.
3. Reus VI. Mental disorders. In: Harrison's Principles of Internal Medicine. 16th Ed. New York: McGraw-Hill; 2006:2553-2556.
4. Marshall M. An overview of drugs in Oceania. In: Drugs in western Pacific Societies: Relations of Substance. ASAO Monograph No II; University Press of America: Lindstrom L-Lanham, 1987:13-49.
5. Farmworth ER. Betel nut – its composition, chemistry and uses. In: Sciences in New Guinea. 1976:85-90.
6. Asthana S, Greig NH, Holloway HW. Clinical pharmacokinetics of arecoline in subjects with Alzheimer's disease - Clinical Pharmacology and Therapeutics. 1996;60:276-282.
7. Ahsana dar, Shagufta Khatoon. Antidepressant effects of ethanol extract of Areca Catechu in rodents. Phytotherapy research. 1998;11(2):174-176.
8. Kumosani TA. Effect of Areca Nut Extracts on Some Organ Markers from Rat Serum in Vivo. J. King Saud Univ.2003;15(1):1-10.