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Anthelmintic Activity of *Areca catechu* Leaves on *Pheritima posthuma*



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ABSTRACT

The anthelmintic property of fresh aqueous + acetone extract of *Areca catechu* belonging to family Arecaceae was studied for anthelmintic activity against *Pheritima posthuma* (Indian earthworm). Four concentrations (25, 50, 75 and 100 mg/ml) of leaves extract were studied in a bioassay, which involve the determination of time of paralysis and time of death of the worms. 100 mg/ml conc. of aqueous + acetone extract of leaves of *Areca catechu* reveal considerable anthelmintic activity as compared to other three conc. and piperazine citrate (10 mg/ml). Piperazine citrate and saline water were including in the assay as standard reference drug and control, respectively.



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INTRODUCTION

Areca catechu (Arecaceae) is an erect unbranched palm tree, growing mainly in south and south-east Asian countries. It is commonly used in day to day life, also known as Supari (Hindi). Traditional use of medicines is recognized as a way to learn about the potential of future medicines.^[1] They have various utilities of *Areca catechu* like Anthelmintic, Antibacterial, Anti-inflammatory, Oxytocic, Clastogenic, Anti-hypertensive, Anti-convulsant, Anti-venom activity, Learning and Memory improvement, Anti-aging, Anti-malaria *etc.* In spite of all these medicinal values of areca nut, its chronic consumption or chewing may cause several adverse effects including carcinogenesis.^[2, 3]

Scientific classification:

Kingdom: Plantae

Division: Angiosperms

Order: Arecales

Family: Arecaceae

Genus: *Areca*

Species: *Catechu*

Binomial name: *Areca catechu* Linn.^[4]

Common names:

Their common name includes Supari in Marathi, Gujarati and Hindi, Pinang palm & Betel tree in English,^[4] Adakka in Kannada & Malayalam, Puga in Sanskrit and Kamugu in Tamil.^[4]

Chemical constituents:

The chemical composition of *Areca catechu* have been reported and reviewed in literature. The major constituents of *Areca catechu* found to be are carbohydrates, fats, proteins, crude fiber, polyphenols (flavanols and tannins), alkaloids and mineral matter. Variations in the

concentrations of the various constituents may occur in betel-nut tree from different geographical locations and according to the degree of maturity of the tree. Tannins, alkaloids and some minerals that may have biological activity and adverse effects on tissues have been reported. Among the chemical constituents, alkaloids are the most important biologically. The nut has been shown to contain at least six related alkaloids, of which four (arecoline, arecaidine, guvacine and guvacoline) have been conclusively identified in biochemical studies. Polyphenols (flavonols and tannins) are responsible for the astringent taste of the nut. [5, 6, 7, 8]

Description:

Areca nut is an erect, unbranched palm reaching heights of 12-30 m, depending upon the environmental conditions. The stem, marked with scars of fallen leaves in a regular annulated form, becomes visible only when the palm is about 3 years old. Girth depends on genetic variation and soil conditions. Root system adventitious, typical of monocots. The adult palm has 7-12 open leaves, each with a sheath, a rachis and leaflets. The leaf stalk extends as the midrib until the end of the leaf and ends as leaflets. Male flowers very numerous, sessile, without bracts; calyx 1-leaved, small, 3-cornered, 3-parted; petals 3, oblong, rigid striated; stamens 6, anthers sagittate. Female flowers solitary or 2 or 3 at or near the base of each ramification of the spadix, sessile, without bracts; sepals permanent; staminodes 6, connate, styles scarcely any; stigmas 3, short, triangular. Fruit a monocular, one-seeded berry, 3.8-5 cm long, smooth orange or scarlet when ripe, with a fibrous outer layer. The generic name is derived from the common name used by the people of the Malabar Coast in southwestern India. [8, 9]

Image of Areca catechu leaves:



Fig. No. 1: Leaves of *Areca catechu*

Distribution:

Areca catechu is the areca palm or areca nut palm, a species of palm which grows in much of the tropical Pacific, Asia, and parts of East Africa. The palm is believed to have originated in either Malaysia or the Philippines. *Areca* is derived from a local name from the Malabar Coast of India and *Catechu* is from another Malay name for this palm 'caccu'.^[5]

MATERIALS AND METHODS

Plant Material:

The fresh leaves of *Areca catechu* have been collected from the local area at Shahada and authenticated by Dr. Santosh K Tayade, HOD of Botany, Art's Science and Commerce College, Lonkheda, Shahada, Dist-Nandurbar (MS).

Worms:

Indian earthworms (*Pheritima posthuma*) were used to study anthelmintic activity. The earthworms were collected from moist soil at local area at Taloda, Dist-Nandurbar. The average size of earthworm was 6 - 8 cm. All worms were washed with normal saline and kept in beakers

containing normal saline separately.

Preparation of Extracts:

Collected fresh leaves of *Areca catechu* were dried and crushed to coarse powder and pass it through sieve no 40 to get fine powder and subject it to maceration with Acetone + water, then dried it by using evaporator and then extract was subjected to preliminary phytochemical testing. [10, 11, 12]

Drugs and chemicals:

1. Piperazine citrate.
2. Saline solution.

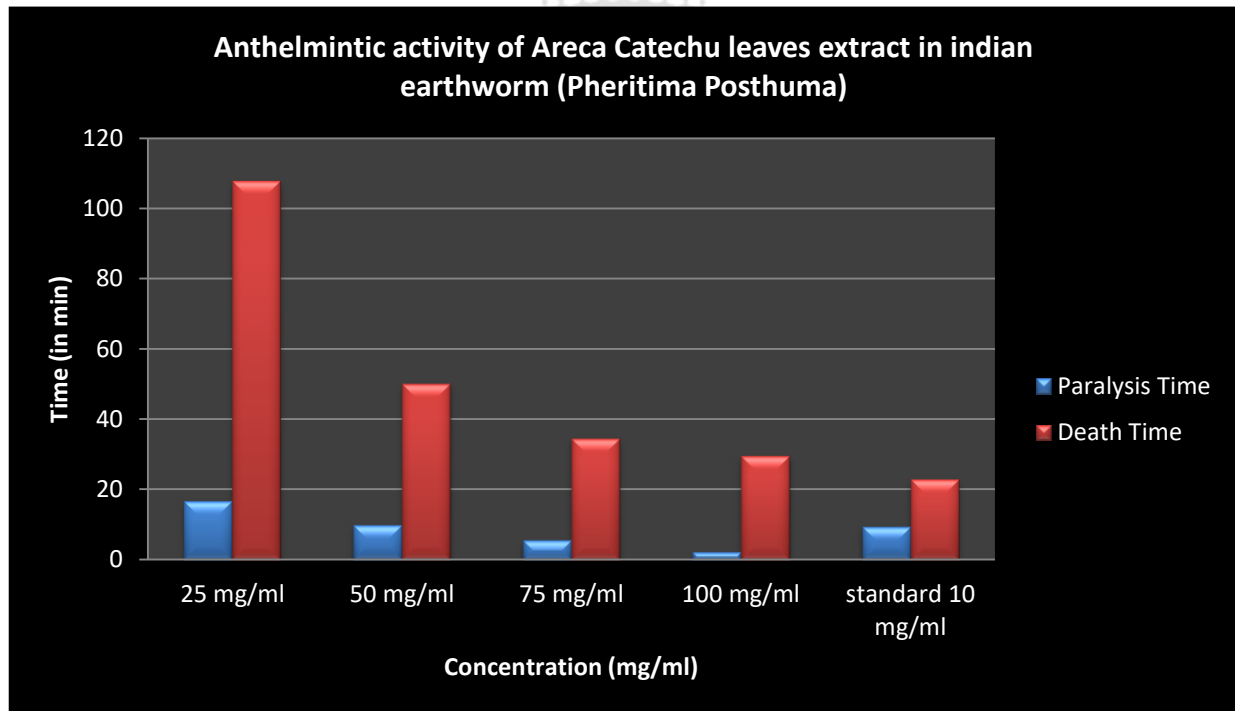
ANTHELMINTIC ACTIVITY

The anthelmintic assay was carried as per the method of Ajaiyeoba *et.al*, with necessary modification. [13] The assay was performed on adult Indian earthworm *Pheritima posthuma*, due to it's anatomical and physiological resemble with the intestinal roundworm parasite of human being. [14, 15] Because of easy availability, earthworm has been used widely for initial evaluation of anthelmintic compound *in vitro*. [16] 25 ml of formulation containing different concentration of crude drug aqueous + acetone extract (25, 50, 75,100 mg/ml in distilled water) were prepared and 3 worms of same type were placed in it. Time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Time for death of worms were recorded after ascertaining that worms neither move when shaken vigorously nor when dipped in warm water (50°C). Piperazine citrate (10 mg/ml) was used as reference standard while saline water as control.

Table No. 1: Anthelmintic activity of *Areca catechu* leaves extracts on Indian earthworm (*Pheritima posthuma*)

Sr. No	Extracts	Conc. (mg/ml)	Indian Earthworms (<i>Pheritima posthuma</i>)	
			Time of Paralysis in min (P)	Time of Death in min (D)
1.	Aqueous + Acetone	25	16.85 ± 1.30	107.91 ± 3.0
		50	9.95 ± 1.55	50.21 ± 2.50
		75	5.64 ± 1.25	34.63 ± 1.50
		100	2.29 ± 0.55	29.66 ± 1.0
2.	Standard (Piperazine citrate)	10	9.55 ± 0.65	23.05 ± 1.35
3.	Control (Saline solution)	-	-	-

Graph 1: Anthelmintic activity of *Areca catechu* leaves extracts on Indian earthworm (*Pheritima posthuma*)



STATISTICAL ANALYSIS

The data presented as mean + SEM. The activities of extract were compared with the control. The extract showed significantly higher duration of paralysis and death value of $P < 0.001$ were considered statistically significant. [17, 18]

RESULTS AND DISCUSSION

From the observations made, higher concentration of leaves extract produced paralytic effect much earlier and the time to death was shorter for all worms. The aqueous + acetone extract showed anthelmintic activity in dose-dependent manner giving shortest time of paralysis (P) and death (D) with 100 mg/ml concentration, for worms. Evaluation of anthelmintic activity was compared with reference standard Piperazine citrate.

From the above results, it is concluded that *Areca catechu* leaves extracts used by tribals traditionally to treat intestinal worm infections, showed significant anthelmintic activity. 75 mg/ml aqueous+ acetone extract exert paralytic effect in 5.64 ± 1.25 minutes and death time in 34.63 ± 1.50 minutes whereas 100 mg/ml aqueous + acetone extract exert paralytic effect in 2.29 ± 0.55 minutes and death time in 29.66 ± 1.0 minutes. Above two concentrations requires less time for paralysis and death of worms as compared to effect produced by the standard drug piperazine citrate. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as anthelmintic. The plant may be further explored for its phytochemical profile to recognize the active constituent accountable for anthelmintic activity.

CONCLUSION

From the above results, it is concluded that the aqueous+ acetone leaves extract of *Areca catechu* Linn shows potent anthelmintic activity than standard anthelmintic drug. Further studies using *in vivo* models are required to carry out and establish the effectiveness and pharmacological rationale for the use of *Areca catechu* leaves Linn as an anthelmintic drug. The drug can be further explored for the isolation and characterization of the active constituents responsible for anthelmintic activity.

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