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Evaluation on Phytochemical Screening and Anthelmintic Potencies of Leaf Extracts of *Caryota urens* (L.) in Aqueous and Alcoholic Solvents

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Abstract

Caryota urens (L.) belonging to the family of Arecaceae having synonyms as fishtail palm, kithul palm, toddy palm is a palm tree having many uses in respect to its traditional literature but with very little scientific evidences. The current research work is aimed to perform the comparative phytochemical analysis of the leaf extracts of Caryota urens in alcoholic and aqueous solvent and determine the anthelmintic potency using Pheretima posthuma as test specimens. The research was initiated by collecting the fresh plant material and its authentication then was studied for its morphological features to confirm its identity and compared its phytocompound detection in aqueous and alcoholic extracts followed by evaluation of anthelmintic efficacy in both extracts and the results are verified by studying the parameters like time of paralysis and time of death and the potency was compared with reference standard Albendazole. The alcoholic and aqueous extract of Caryota urens(L.) exhibited significant anthelmintic activity as evidenced by dose dependent paralysing time and death time. Further extensive research is required for determining their pharmacological activities.

Keywords: *Caryota urens(L.), Pheretima posthuma, phytocompounds, helminthiasis, anthelmintics*

1. Introduction

The branch of science which relates with identifying, authenticating and processing of natural products intended for medical use is coined as Pharmacognosy. Since medicinal plants have long been a power house of cures for human illnesses, It makes a point that one-fourth of the world's population, rely on natural medicine to treat their various illnesses. With wide range of people looking for treatments and health strategies avoiding the negative effects brought on by synthetic pharmaceuticals, medicinal herbs are transitioning from being used in a low capacity to being more widely accepted [(1)].

The Arecaceae comes from a family of flowering perennial plant in the order of arecales. They are grown in the form of tree-like stem less plants, climbers, and arte commomly known as Palms[(2)]. Currently, 181 genera with around 2,600 species are known, [(3)(4)] most of which are restricted to tropical and subtropical climates. Palms are among the best known and most extensively cultivated of all plant families. They have been important to humans throughout most of history. There are many common products and foods that are derived from palms. In contemporary times, palms are also widely used in landscaping. In many historical cultures, because of their importance as food, palms were symbols for such ideas as victory, peace, and fertility.

To indicate about the importance of palms in ancient times it is said that they are mentioned more than 30 times in the Bible, [(5)] and at least 22 times in the Quran[(6).] The different species belonging this family include *cocos nucifera, borrasus flabellifer, caryota urens, dypsis lutescens, phoenix sylvestris.*

Arecaceae plants possess many uses in medicinal and for regular human needs like coconut is an edible seed from plant *cocos nucifera,* carnauba wax is obtained from brazilian palm, Palm sap is fermented to

produce palm wine or toddy, which is common alcoholic beverage common in parts of Africa, India, and the Philippines. The sap may be drunk fresh, but fermentation is rapid, reaching up to 4% alcohol content within an hour, and turning vinegary in a day. [7] Palmyra and date palm sap is harvested in Bengal, India, to process into *gur* and *jaggery*

Caryota urens species belongs to the Arecaceae family and is native to Srilanka, India, Myanmar and is grown in fields and rainforest clearings [8] which is a solitary-trunked tree that can measure 18 metres (59 feet) in height [9] and up to 30 centimetres (12 inches) wide. Widely spaced leaf-scar rings cover its gray trunk which culminate in a 6 m (20 ft) wide, 6 m tall leaf crown. The bipinnate leaves are triangular in shape, bright to deep green colour.

In *Caryotas*, the fruit pulp contains oxalic acid, thhe compound is skin and membrane irritant. The species *Caryota urens* is called kithul in srilanka and the trunk contains high starch content in them and juice can be collected from shoots of stem.

Toddy that is being extracted from the inflorescence is considered somewhat powerful compared to toddy extracted from other palm trees. The pulp of the mature plant is cut, sun dried, and powdered, and is edible. It is sweet in taste [10][11]

The major phytocompounds include steroids, carbohydrates, alkaloids, tannins, flavonoids etc.The major activities exhibited include the anti-microbial, anti-oxidant, hepato-protective etc. The sap obtained is used as cooling property and traditionally used for urinary disorders, seminal weakness, snake bite, rheumatic swelling etc.

Helminthic infection is one of the common widespread infections in humans, and afflicts a significant portion of the global population. They might cause serious threat to human health in impoverished countries and contribute to the high rates of pneumonia, eosinophilia, anaemia, and malnutrition. Antihelmintics are medicines that drive out the helminths that are invading or even either kill. Many helminths reside in the digestive tract. The host is harmed by helminths in a number of ways which may include blood loss, food deprivation, organ damage, intestinal or lymphatic obstruction, and toxin secretion. Helminthiasis rarely results in death but is a significant cause of illness. The class of anthelmintic medications includes albendazole, mebendazole, and others that controls the parasitic worms (Helminths) without any dangerous harm to host along with other internal parasites [12].

Fig:1 Leaves of *Caryota urens*(L)

Table :1 Scientific Classification of *Caryota urens*(L)

SCIENTIFIC CLASSIFICATION	
Kingdom:	**PLANTAE**
***Clade*:**	**TRACHEOPHYTES**
***Clade*:**	**ANGIOSPERMS**
***Clade*:**	**MONOCOTS**
***Clade*:**	**COMMELINIDS**
Order:	**ARECALES**
Family:	**ARECACEAE**
Genus:	***CARYOTA***
Species:	***C. urens***

2. Materials and Methods

Collection and Authentication of Plant Material:

The leaves of *Caryota urens*(L) required for the study were collected from a private property in Hyderabad (Dist), Telangana.and the collected leaves of plant were authenticated by Dr. A. Vijaya Bhaskar Reddy, Head of the Dept. of Botany, Osmania University, Hyderabad and the voucher specimens were kept for further reference in the department.

Physico-Chemical Parameters:

The shade dried leaves of *Caryota urens*(L) was subjected for determination of physiochemical parameter such as an extractive value, total ash content, percentage moisture content was determined according to standard method (Indian pharmacopeia.,2018)

The extractive value was found by extracting the drug powder from crude drug by subjecting it to Maceration method of extraction where the drug was subjected to 24 hrs. of Maceration followed by distillation. Petroleum Ether, ethanol and water are the solvents used for the extraction and the extract obtained was evaluated for phytocompounds. [(13)]

Phytochemical Screening:

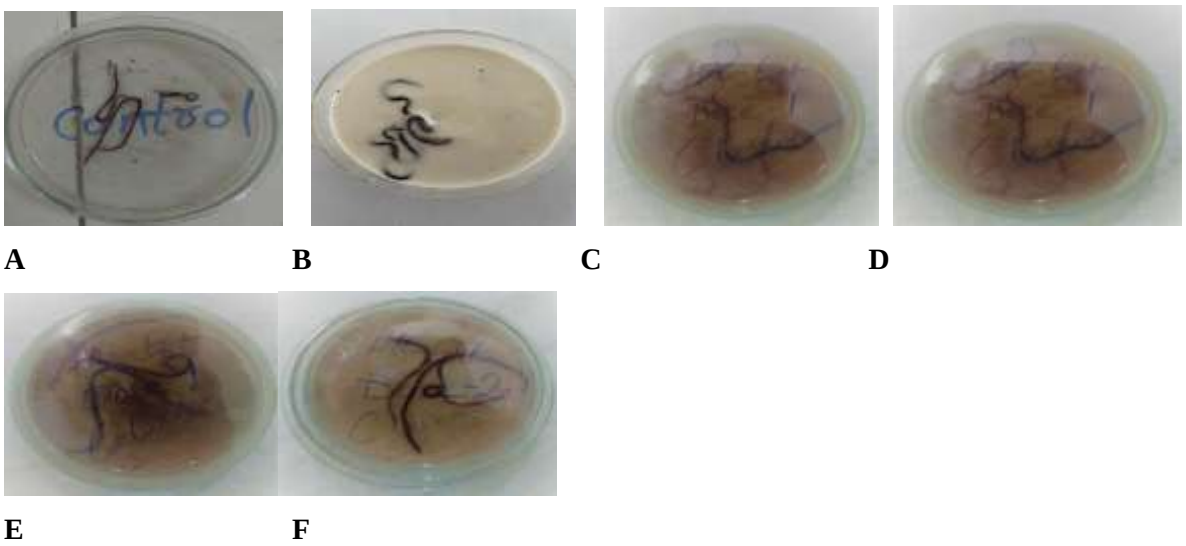
The extracts underwent a variety of chemical testing. These tests were carried out to find the presence of substances like Tannins and Phenolic Compounds, Alkaloids, Enzymes, Amino Acids, Carbohydrates, Fats, Glycosides, Steroids, Proteins, and Fats. [(14)]

Table:2 Identification tests for detection of Phytocompounds

PHYTOCOMPOUND	IDENTIFICATION TEST
Carbohydrates	Molishe test, Fehling's test, Benedict's test
Proteins and amino acids	Biuret test, Xanthoproteic test, Ninhydrin test
Steroids	Salkowski test, Liebermann burchard test
Cardiac glycosides	Legal's test, Keller-Killiani test
Alkaloids	Dragendroff's test, Mayer's test, Hager's test
Saponins	Foam test, Haemolysis test
Flavonoids	Shinoda test, Ammonia test, Ferric chloride test
Tannins and Phenolic compounds	Ferric chloride test, Acetic acid test, Nitric acid test
Fats and Oils	Filter paper test,Solubility test

In Vitro Anthelmintic Activity

Pheretima posthuma (Annelida), with an average length of 6 to 8 cm, were found in areas of soil that had been inundated with water. To get rid of the filth that was stuck to them, they were cleaned with tap water. With a few adjustments, the anthelmintic activity screening was carried out using the technique explained by Ajayieoba et al [(15)]. Due to its morphological and physiological similarities of roundworm parasites present in human intestine, the testing was carried out on adult Indian earthworms (*Pheretima posthuma*). Worms called *Pheretima posthuma* are readily available and are a good model for testing anthelmintic medications. In a 20 mL formulation with two different strengths of each crude alcoholic and aqueous extract of leaf (20 and 40 mg/mL in double distilled water), three earthworms of the same size were inserted. In both the test solution and the regular treatment solution, the worms could only move when they were violently shaken, and that is when the 'time for paralysis' was observed. The 'period for death' of the worms was identified after it was found that they remained motionless in 50 °C warm water or when violently shook. The maximum duration for paralysing and dying *Pheretima posthuma* worms was determined using pure water as the vehicle control and albendazole 20mg as the reference standard. Mean±Standard error of the mean was used to express the mean paralysis time and mean lethal time for each sample. [(16)(17)]



A **B** **C** **D**

E **F**

Fig. 2: Anthelmintic activity of aqueous and alcoholic extracts of *Caryota Urens* on *Pheretima posthuma* worm.

A: control; B: Standard; C: Aqueous Extract(*CU*)- 40 mg/mL; D: Aqueous Extract(*CU*) -20 mg/mL; E: Alcoholic Extract(*CU*)- 40 mg/mL; F: Alcoholic Extract (*CU*)-20 mg/mL.

3. Results and Discussion

Physico-Chemical Study:

The physico-chemical parameters indicate the quality of the plant product and identifying whether it was adulterated or not by determining the acid insoluble ash values that indicates the presence of sand or inorganic material and extractive values indicate the percentage of phytocompounds present. The results were summarized in table 3.

Table 3: Results indication for Physico-chemical Parameters

Parameters	**Values Obtained (w/w)of *Caryota urens*(L.)**
Total Ash Value	19.37%
Water soluble ash	4.75%
Acid-Insoluble ash	15%
Moisture Content	3.2%
Water Soluble Extractive value	17.04%
Alcohol Soluble Extractive value	15.19%

All the tests were performed in triplicate and the mean values were calculated to obtain the final readings.

Phytochemical Analysis:

The extract of *Caryota urens* was used for the initial phytochemical screening. Glycosides, saponins, steroids, alkaloids, flavonoids, proteins, and tannins were among the numerous elements that were under determination.

The preliminary phytochemical screening revealed that the extract of *Caryota urens* includes a variety of phytochemicals, which are listed in table.4. An extract of petroleum ether revealed the presence of lipids and steroids. Aqueous extract contains saponins, steroids, sugars, flavonoids and tannins. Whereas the ethanol extract contains the carbohydrates, tannins, and steroids.

Table 4: Results of Phytochemicals detected in screening.

CHEMICAL CONSTITUENTS	**Petroleum ether extract**	**Ethanolic extract**	**Aqueous extract**
Carbohydrates	-	+	+
Tannins	-	+	+
Proteins	-	-	-
Alkaloids	-	-	-
Glycosides	-	-	-
Flavonoids	-	-	+

Steroids	+	+	+
Saponins	-	-	+
Fats and Oils	+	-	-

Indications: (+) - positive,(-) – negative

In-Vitro Anthelmintic Screening

It was determined from the anthelmintic action at a concentration dependent paralysis action was present considerably earlier than the moment of death. Although both extracts from the plant displayed dose-dependent anthelmintic action (shown in figure 2), Comparing the aqueous extract of *Caryota urens* to the reference standard albendazole, it seemed more efficient. The higher dose aqueous extract of leaves of *Caryota urens* caused paralysis at 25±011min and time of death at 36±0.28min respectively. Whereas the treatment with alcoholic extract showed that the earthworm *Pheretima posthuma* paralysis time of 37±0.28min while time of death was 45±0.81min. Tannins [18] and flavonoids [19] have been shown to have anthelmintic effects, because they can attach to free proteins in the digestive system of the host animal or glycoprotein on the cuticle of the parasite killing the parasites [20, 21]. The aqueous and alcohol extract's wormicidal activity on earthworms suggests that it is beneficial against human parasitic infections [22]. Finding the active ingredient behind the anthelmintic activity and also analysing their other pharmacological effects would be intriguing.

Table 5: Anthelmintic Activity of Aqueous and Alcoholic Extract of Leaves of *Caryota urens* (L.)

Group	Concentration(mg/mL)	Paralyzing time (Min)*	Death Time (Min)*
Control	-	-	-
Aqueous extract-1(*CU*)	40	25±0.11	36±0.28
Aqueous extract-2(*CU*)	20	41±0.32	49±0.72
Alcoholic extract-1 (*CU*)	40	37±0.28	45±0.81
Alcoholic extract-2 (*CU*)	20	50±0.43	59±0.88
Standard	20	6±0.87	8±0.58

* Mean ± SEM. Followed using ANOVA method of statistics.

4. Conclusion

In conclusion, it can be said that the authentication using macroscopic study and physico-chemical features help in plant identification for further studies. In accordance with the results attained in different areas of study including phytochemical screening for the plant *Caryota urens* (Arecaceae) confirmed the presence of phytoconstituents such as steroids, saponins, amino acids, alkaloids, tannins, carbohydrates, flavonoids in different solvent extracts. Further the anthelmintic evaluation of the leaf extracts indicated that the aqueous extract of *Caryota urens* at 40 mg/mL dose shown efficient anthelmintic activity when compared to the alcoholic extract, further pharmacological studies can be performed to understand the medicinal importance of the plant.

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Declarations

Conflicts of interest: The authors declare that they have no conflict of interests

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