STUDIES ON PHYTOCHEMICAL SCREENING OF COCONUT WATER

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ABSTRACT

Medicinal plants are an important part of local culture that also have a worldwide impact. Medicinal plants and medicines derived from plants are the foundation of many contemporary medications used to treat a wide range of conditions. The photochemical analysis of coconut water was the subject of this study. The phytochemical analysis was carried out by the normal operating protocols after the fresh coconut water had been extracted from the fresh coconut fruit. In the early phytochemical examination, the water from *Cocos nucifera* was found to include alkaloids, flavonoids, phenolics, steroids, and tannins. Additionally, glycosides, phenolics, terpenoids, and alkaloids were found in the water, but other compounds were not found. Based on the findings of this study, coconut water may have some beneficial medical properties, particularly due to the presence of phenolics and alkaloids. In this research, *C. nucifera* L. was subjected to phytochemical examination. The objective of the study was to determine which phytochemical constituents are present in the endosperm of the *C. nucifera* species. The collection of *C. nucifera* nuts, which are obtained by harvesting a coconut tree, was the responsibility of the Botany Department of the Government Degree College Agraharam. To remove the brittle endosperm, the nuts needed to be broken open first (kernel). Following the cutting, rinsing, and drying processes, the endosperm was eventually milled using a laboratory device. Studies on the milled kernel's phytochemistry uncovered the presence of terpenoids, alkaloids, resins, glycosides, and steroids, among other phytochemical components. There was not a single shred of evidence pointing to the presence of flavonoids or acidic compounds. On the other hand, the studies of the macronutrients showed that there were carbohydrates and proteins present, although there was less sugar, fat, and oil. Although phytochemicals including alkaloids, steroids, and terpenoids are known to have antioxidant properties, it is widely acknowledged that oil is the key component necessary for the medicinal advantages of coconut. Even though the other macronutrients mentioned above are required, this is still the case. The use of coconut in one's diet also has repercussions, which will be detailed below, about one's general health.

Keywords: *Cocos nucifera*, Tannins, Alkaloids, Flavonoids, Saponins, and Glycosides

Introduction: Natural phytochemicals that are derived from medicinal plants have recently received a lot of attention for their potential use in the treatment of a variety of human clinical diseases, including cancer. The plant is referred to by its Greek name, phyto. There are numerous phytochemicals that are "familiar," and they are beneficial to the human body in a variety of ways. Humans may be protected against a wide variety of diseases by phytochemicals. They are compounds found in plants that do not contribute to the plant's nutritional value but do offer protection or help avoid disease. However, a recent study has shown that many phytochemicals can also protect humans from disease. Plants create these substances as a means

of self-defense; however, many phytochemicals can also protect humans from disease. Fruits and plants contain a wide variety of phytochemicals, each of which performs a unique function. The coconut palm, or *C. nucifera*, has been called the "tree of life," the "tree of heaven," and the most valuable gift that nature has given to humankind. Every portion of the coconut palm tree has the potential to be utilized in the production of useful products for the local population. Arecaceae is the family that includes the most common type of tree, which is called *C. nucifera*. (palm). Coconut, or the coconut palm, is the popular name for the species *C. nucifera*. It is believed that the Ido-Malayan region is where the coconut first originated, and from there, it spread throughout the tropical regions. The coconut palm is a monoecious plant, which means that it produces both male and female flowers on the same inflorescence. This inflorescence is known as a spadix, and it develops inside a sheath of wood called a spathe. At the time of flowering, the spathe will split down the middle, revealing the spadix. Each spadix consists of a main axis measuring between 1 and 1.5 meters (3 to 5 feet) in length, and it has between 40 and 60 branches or spikelet's that bear the flowers. When growing conditions are suitable, the first flowering typically occurs between 4 and 5 years after planting.

Although drought conditions can delay the emergence of the spadix or cause it to abort, the number of female flowers that are produced on each spadix varies. Once a palm reaches maturity, a spadix (flower spike) is produced in every leaf axil. Since the floral primordial are initiated 12 months before the spadix emerges, the number is correlated to the growing conditions (weather, nutrition) 12 months before emergence from the literature survey, it is quite evident that the flowers of *C. nucifera* have potent therapeutic value in the areas of anti-bacterial, larvicidal, antioxidant, dietary anti-inflammatory, hepatoprotective, and anti-cancer properties. The primary objective of the current study is to isolate and characterize a selection of *C. nucifera* water extract's potentially beneficial phytochemical components.

DESCRIPTION

Plant *C. nucifera* is a big palm that may grow up to 30 meters (98 feet) tall. It has pinnate leaves that are 4-6 meters (13-20 feet) long and pinnae that are 60-90 meters long. When the old leaves fall off, the trunk is left smooth. The tall and the dwarf varieties of coconuts are the two primary categories that are used to describe this fruit. On the very fertile ground, a tall coconut palm tree can produce as many as 75 coconuts annually; however, the average tree produces less than 30, primarily because of improper cultural practices. Coconut palms can produce their first fruit anywhere between six and ten years after being planted, but it can take anywhere from fifteen to two hundred and thirty years for the tree to achieve its full output potential. In terms of its botanical classification, a fruit is either a drupe or a genuine nut. Like other fruits, the coconut fruit is composed of three distinct layers: the exocarp, the mesocarp, and the endocarp. The "husk" of the coconut is composed of both the exocarp and the mesocarp. The exocarp, or outermost layer, of coconuts typically found in stores located in non-tropical regions of the world, has been removed. The mesocarp is made up of a fibre known as coir, which can be utilized in a variety of ways, both traditionally and commercially. After the husk has been removed, the outer surface of the shell reveals three germination pores (stoma) or "eyes" that are visible on the surface of the shell. About 1.44 kilograms is the weight of a mature coconut. (3-216). To generate one tonne of copra, around 6,000 mature coconuts are

required. When it comes to its roots, the palm tree is not like other plants in that it does not have a tap root or root hairs but rather a fibrous root system.

The root system of a coconut palm is made up of a multitude of thin rooks that grow outward from the plant near the surface, with just a select handful of the roots penetrating deep into the soil for the purpose of providing the plant with support. Grasses have what is referred to as a fibrous or adventitious root structure, which is a distinguishing feature of the genus Poaceae. Various other kinds of huge trees develop a solitary tap root that extends downward and gives rise to several feeder roots nearby. Throughout their whole lives, coconut palms grow new roots at the base of the stem where they first emerged. The number of roots produced by a tree is directly proportional to its age as well as its surrounding environment; a tree that is between 60 and 70 years old may have produced more than 3,600 roots. The thickness of the roots remains consistent all the way from the tree trunk to the root tip. Inflorescence: Because both male and female flowers are produced on the same inflorescence, the palm is said to be monoecious. The term "polygamomonoecious" is used in certain other texts. The male flower is significantly smaller in size compared to the female blossom. There is a constant blooming of flowers. Although there are a few dwarf kinds that may pollinate themselves, it is generally accepted that coconut palms are predominantly cross-pollinated.

Statement of problem:

India is a well-known Government Area that contains a significant quantity of *C. nucifera* trees, which contain a variety of medicinal properties. The chemical makeup of coconut water can change depending on several different conditions. It was shown by Jackson *et al.* (2013) that the coconut water of various species of coconuts includes a diverse concentration of chemicals and that the chemical contents also vary throughout the various stages of maturation. Nehad, (2012). The chemical composition of coconut water can also be altered by factors such as the soil and the surrounding environment. Catechin, gallic acid, ellagic acid, and lupeol were isolated from the plant and shown to have antibacterial and antioxidant characteristics, according to the findings of researchers who worked on *C. nucifera* plants. These compounds were found to be present in the plants. Ogunwande, (2011).

The phytochemical screening on coconut water extract that was conducted in this study included the following: qualitative detection of alkaloids, flavonoids, glycosides, saponins, tannins, steroids, terpenoids, and acid compounds; and quantitative determination of the therapeutic properties of these compounds, including total phenol content, antioxidant, anti-inflammatory, and reducing power activities. To be more specific, phytochemical elements of the root part of *C. nucifera* were investigated, and the antifungal activity of the root was tested to see whether *C. nucifera* could suppress the action of the water extract.

Aim of the Study

The aim of this work is to analyze phytochemical screening on Coconut water in Siricilla, District Telangana state.

Objectives of the Study

The specific objectives are to carry out phytochemical screening on coconut water.

1. To determine the collection of drying and pulverization of coconut water.
2. To determine the Extraction of coconut water using distilled water by maceration method.
3. Determination of phytochemicals present in the extract of the plant.

Research Hypothesis

1. There is no significant difference between the collecting of the drying and pulverization of coconut water.
2. There is no significant difference between the extraction of coconut water using distilled water by maceration method.
3. There is no significant difference between the determination of photochemical present in the extract of the plant.

Material and methods:

The semi-solid extract of *C. nucifera* was subjected to the phytochemical assays detailed below to identify the active ingredients. These tests were carried out in accordance with the protocols and methods detailed in Trease and (Evans 2002). These phytochemical tests were carried out with the purpose of determining whether the plant under research had secondary metabolites. These secondary metabolites include alkaloids, tannins, saponins, resins, flavonoids, steroids, glycosides, and terpenoids.

The secondary metabolites, alkaloids, flavonoids, tannins, terpenoids, and saponin were discovered and isolated from plants that have been researched to indicate that the compounds have value in the treatment of anticancer, antibacterial, analgesic, anti-inflammatory, antitumor, and antiviral conditions. A crude extract of bark and leaves made with methanol can be used to test for the presence of secondary metabolites. The removal of the roots is another viable option. The indication that is used to determine the quality of the outcome is expressed as a plus sign (+) for the presence of phytochemicals and a minus sign (-) for their absence. (Iqbal, 2015).

Chemicals

The list of chemicals used was dilute hydrochloric acid and filtered, concentrated sodium hydroxide (NaOH), iron (III) chloride ($FeCl_3$), concentrated hydrochloric acid (HCL), and Wagner's reagent, Mayer's Reagent

Apparatus

The list of apparatus used was an autoclave sterilizer, beaker, capillary tube, centrifuge, conical and round bottom flask, cuvette, electronic balance, filter funnel, filter paper, graduated cylinder, incubator shaker, measuring cylinder, micropipette, micropipette tips, petri dish, rotary evaporator, spectrophotometer, test tube.

Material and methods

Plants and Plant Materials *C. nucifera* L. nuts were obtained from a coconut tree in the Botany Department of Govt Degree College Agraharam. Prof. V.S Raju, the taxonomist of Kakatiya University, made the identification based on a preliminary examination of the nut and morphological components.

Collection of plant material

Some nuts of coconut were collected from the Department of Botany, Govt Degree College Agraharam Siricilla District They were dehusked and the nuts were broken to release the solidified endosperm (kernel) and coconut water. The endosperm was washed, grated, and dried. The dried substances were crushed in a mortar with pistil in the laboratory then removed solvents were mixed with coconut water and filtrated with filter paper the excess solvent in the extract was collected in a 500 ml Conical flask after being put in a water bath for five minutes and stored in desiccators at room temperature. The extracts were utilized for phytochemical analysis detection.

Phytochemical screening:

The extract was analyzed for the presence of Alkaloids, phenolic compounds, tannin, saponin Glycosides, Phenolics, Steroids, and Terpenoids only absent in Flavonoids.

1) Test for Alkaloids:

A quantity (0.2gml of the sample was boiled. with 5ml of 2% HC1 on a steam bath. The mixture was filtered, and a 1.0 ml portion of the filtrate was measured into four test tubes. Each of the 1ml filtrates was treated with 2 drops of the following reagents.

a) **Dragendorff's Reagent:** A red precipitate indicates the presence of alkaloids.

b) **Mayer's Reagent:** A creamy-white colored precipitate indicates the presence of alkaloids.

c) **Wagner's Reagent:** A reddish-brown precipitate indicates the presence of alkaloids.

d) **Picric Acid (1%):** A yellow precipitate indicates the presence of alkaloids.

1) **Phenol Test**:

When 0.5ml of $FeCl_3$ (W/V) solutions was added to 2ml of test solutions, the formation of an intense color indicated the presence of phenols.

2) **Tannins:**

Ferric Chloride Test:

A test tube containing 20 ml of water and a tiny amount of extract was brought to a boil, and then a few drops of 0.1% Ferric chloride were added. The mixture was then examined for a coloration that was either brownish-green or blue-black, which is an indication of the presence of tannins.

4) Saponins.

a) Foam test 1ml solution of extract was diluted with distilled water to 20 ml and shaken in a graduated cylinder for 15 minutes. The development of stable foam suggests the presence of saponins.

b) 1.0 ml extract was treated with 1% lead acetate solution. The formation of white precipitates indicates the presence of saponins.

Fig -I The screening of phytochemical experiments from coconut water separation in Coconut Nuts is being conducted in the Botany laboratory under the supervision of Dr. T. Srinivas, Asst. Prof of Botany GDC Agraharam.

Fig-II The screening of phytochemical experiments from coconut water extract is being conducted in the Botany laboratory under the supervision of Dr. T. Srinivas, Asst. Prof of Botany GDC Agraharam.

Table -I Results of the Phyto chemical Analyses on the milled endosperm (Coconut Water) of *Cocos nucifera* using Solvent Extract (water).

Sl. No	Phytochemical Test	observation	interference	Intensity
1	**Test for Alkaloids** **a) Dragendorff's Reagent** **b) Mayer's Reagent** **c) Wagner's Reagent** **d) Picric Acid (1%):**	**a) Brick red precipitate** **b)** creamy-white colored precipitate **c)** A reddish-brown precipitate **d)** yellow precipitate indicates the presence of Alkaloids	**Alkaloids Present**	++ ++ ++ ++
2	**Phenol Test**:	intense colour indicated	**Presents of Phenols**	++
3	**Tannins:** **Ferric Chloride Test**	brownish-green or blue-black	**Presents of Tannins**	+++
4	**Saponins Test**	white precipitates	presence of Saponins	+
5	**Flavonoids:** **Shinoda test.**	No color change	Absence of Flavonoids	-
6	**Glycosides:** **Keller Killiani test**	blue colour at the junction	presence of Glycosids	+
7	**Steroids** **a) Salkowaski test:** **b) Liebermann – Burchard Test**:	**a)** red colour **b)** reddish blue colour	presence of Steroidsds	+ +
8	**Terpenoid:**	A grey colour indicates the	presence of terpenoids	+++

Table: II Macronutrient Analyses on the Milled Endosperm (Coconut Water) of *Cocos nucifera* using Polar Solvent Extract (water)

Sl. No	Phytochemical Test	observation	interference	Intensity
1	**Test for Proteins**	yellow precipitate indicates.	the presence of proteins	+++
2	**Test for Carbohydrate**	A brown ring at the interface indicates.	the presence of carbohydrates	++
3	**Test for Reducing Sugar**	A brick-red precipitate indicates	the presence of reduced sugars	++
4	**Test for Fats and Oil**	The translucency of the filter paper indicates	the presence of fats and oil.	+++

- **Absent.**
  + Present in low concentration
  ++ Present in Moderate concentration
  +++ Present in high concentration

5) Flavonoids: Shinoda test.

To dissolve the extracts, alcohol was used. After heating, a single piece of magnesium was added, then dropwise additions of powerful hydrochloric acid were made. The sudden appearance of a magenta color provided definitive proof that flavonoids were present**.**

6) Glycosides: Keller Killiani test.

A solution of 0.5 ml, containing glacial acetic acid and 2-3 drops of Ferric chloride, was mixed with 2.0 ml of extract. Later, 1.0 ml of concentrated H_2SO_4, was added along the walls of the test tube. The appearance of deep blue color at the junction of two liquids indicated the presence of cardiac glycosides**.**

7) Steroids :Test for Sterols Salkowaski test:

10 ml of extract was dissolved in 2.0 ml of chloroform and 2.0 ml of concentrated sulphuric acid was added from the side of the test tube. The test tube was shaken for a few minutes. The development of red color in the chloroform layer indicated the presence of sterols.

Liebermann – Burchard Test:

1.0 ml of concentrated H_2SO_4 was added to 10 ml of extract in 1.0 ml of chloroform. A reddish blue color exhibited by the chloroform layer and green fluorescence by the acid layer suggests the presence of sterols.

8) Terpenoid: A quantity (9.0 ml) of ethanol was added to 1.0 ml of each of the extracts and refluxed for a few minutes and filtered. Each of the filtrates was concentrated to 2.5ml in a boiling water bath. Distilled water, 5ml was added to each of the concentrated solutions, each of the mixtures was allowed to stand for 1 hour and the waxy matter was filtered off. Each of the filtrates was extracted with 2.5ml of chloroform using a separating funnel. 0.5ml of each of the chloroform extract was evaporated to dryness in a water bath and heated with 3ml of concentrated sulphuric acid for 10 minutes on a water bath. A grey color indicates the presence of terpenoids.

The tests below were carried out to determine the presence of macronutrients in the endosperm of *C. nucifera.*

Test for Proteins: A quantity (5.0 ml) of distilled water was added to 0.1ml of each, of the extracts. This was left to stand for 3 hours and then filtered. To 2.0 ml portion of the filtrate was added 0.1ml Million's reagent. It was shaken and kept for observation. A yellow precipitate indicates the presence of proteins.

Burette Test: A quantity (2.0 ml) of each of these extracts was put in a test tube and 5 drops of 1% hydrated copper sulphates were added. A quantity, of 2.0 ml of 40% sodium hydroxide was also added and the test tube was shaken vigorously to mix the contents. A purple coloration shows the presence of proteins (the presence of two or more peptide bonds).

Test for Carbohydrate: A quantity of 0.1 ml of each of the extracts was shaken vigorously with water and then filtered. To the aqueous filtrate was added a few drops of Molisch reagent, followed by vigorous. shaking again. Concentrated sulphuric acid, 1ml was carefully added to form a layer below the aqueous solution. A brown ring at the interface indicates the presence of carbohydrates.

Test for Reducing Sugar: A quantity of 0.1 ml of each of the extracts was shaken vigorously with 5 ml of distilled water and filtered. To each of the filtrates were added equal volumes of Fehling solutions A and B and shaken vigorously. A brick-red precipitate indicates the presence of reducing sugars.

Test for Fats and Oil: A quantity of 0.1ml of each of the extracts was pressed between filter paper and the paper observed. A control was also prepared by placing 2 drops of olive oil on filter paper. The translucency of the filter paper indicates the presence of fats and oil.

Results & Discussion: These results and discussion of phytochemicals screening on coconut water in Siricilla the raw material used was *C. nucifera* water, The list of chemicals used were dilute hydrochloric acid and filtered, concentrated sodium hydroxide (NaOH), iron (III) chloride ($FeCl_3$), concentrated hydrochloric acid (HCL), and Wagner's reagent, Mayer's Reagent.

Discussion: The phytochemical analyses on the endosperm of *Cocos nucifera L* showed the presence of alkaloids, tannins, and Phenols in high concentration as indicated by the intensity of the colored solution and precipitates formed on detection. Saponins and glycosides were present in moderate concentration. Terpenoids and steroids had the least concentration. The macronutrient analyses showed the presence of carbohydrates, fats, and oils in high concentrations while reducing sugar and proteins were present in moderate concentrations. The macronutrient analyses showed the presence of carbohydrates, fats, and oils in high concentrations while reducing sugar and proteins were present in moderate concentrations. Each result of these analyses (phytochemical and macronutrient), presented in two parts showed the analyses using aqueous and n-hexane /Methanol extracts. Some phytochemicals were present in smaller concentrations in one of the extracts while being present in higher concentrations in the other extract. This can be attributed to their volatility as they may have evaporated during the concentration of n-hexane extract while heating in a water bath. Some macronutrients were also detected. From this research, the presence of phenolic compounds such as terpenoids, and steroids (phytosterols i.e., ß-sitosterol) though in very low concentration contributes to the antioxidant properties of coconut. It is known that coconut is a poor source of phytosterol. The phytosterols fight atherosclerosis and reduce the growth of cancer cells. For many years now, it has been known that plant polyphenols (steroids, terpenoids, flavonoids, etc.) are antioxidants *in vitro*. These antioxidants are compounds that reduce the formation of free radicals or react with and neutralize them thus potentially protecting the cell from oxidative damage. The tannins and resins are employed as astringents both in the gastrointestinal tract and on skin abrasions. On the other hand, the macronutrients; proteins, carbohydrates, and reducing sugar are involved in the energy-giving and bodybuilding function of coconut. The fats and oil constituent of coconut has many functions as the different types of fatty acids contained; all have different functions to perform. Coconut oil contains about 50% lauric acid. Lauric acid is a medium-chain fatty, which is abundant in coconut oil, and is considered responsible for many of its health benefits. Lauric acid has the additional beneficial function of being converted into monolaurin in the human body. Monolaurin is the antifungal, antibacterial, antiprotozoal, and antiviral monoglyceride formed from the metabolism of lauric acid.

Conclusion: The results obtained from the phytochemical analyses of the endosperm of *C. nucifera* showed the presence of alkaloids, resins, steroids, and terpenoids, but the absence of flavonoids. On the other hand, the results obtained from the analyses of macronutrients revealed the existence of proteins, carbs, reducing sugar, lipids, and oil. This study provides support for the use of *C. nucifera* in the treatment of a wide variety of debilitating diseases and conditions, including cancer, diabetes, ulcers, obesity, heart disease, and infections caused by microorganisms. However, the use of *C. nucifera* in medicine and pharmacology is due to the oil that is contained inside it as well as its non-nutrient (phytochemical) content, both of which function as antioxidants against potentially harmful free radicals that are produced by the body system.

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