Coconut Water: A Review on its Health benefits, Pharmacological Properties, Traditional uses.

Abstract Coconut water is an ancient tropical drink a thousand years ago and a symbol of religious culture many years ago. Internationally, the popularity of coconut water is increasing every day. When it stays in the inner cavity of the nut, it is a sterile, pure, sweet and refreshing liquid.Coconut water is rich in nutrients, has natural hydrating qualities and is good for health, so we get the benefits from the coconut tree. It is low in fat and calories, and is rich in antioxidants, vitamins and proteins, potassium and chloride, and contains natural sugars. It is good for the body and can also be used for skin and hair care because it is an excellent source of natural moisture. Therefore, this review summarizes the health benefits and uses of coconut water.

Key Words: Botanical characters, health benefits, pharmacological properties, traditional Uses.

1. Introduction

Cocos nucifera belongs to (Arecaceae) family, coconut water is a tremendous part of coconut tree.The coconut is a widely planted tree and belongs to the palm tree. This tree is widely planted in Africa, America, and Asia, making it native to the eastern tropical regions [1]. Due to its many uses, it is commonly known as “kalpavriksha”, the “tree of life”, and it is one of the ten most important trees in the world, which can be used to provide food for millions of people [2].

The coconut palm is monoecious. Its trunk is large and thick. The height of the coconut tree is about 30 m, with a fibrous root system. The crown of the leaves of the coconut tree is on the upper part of the trunk. The length of the leaves is about 7 meters, and the small leaves gradually narrow. Coconut has a fibrous appearance and belongs to the drupe fruit family. It is also called a single-seed stone fruit because it has a hard outer shell and the seeds are intact in the stony covering (endocarp) of the nut. Green when immature, the shape of green coconut is oval. Coconuts change color when they begin to ripen, from green to yellow and then red-yellow. The inflorescence of the coconut is enclosed in a double sheath. The various parts of the coconut tree are very useful, it provides a shelter, the parts that are used as building materials are the leaves, the trunk of the tree and the root of the tree for medicinal purposes. The fruit of the coconut tree has great commercial value. Coconut fiber is used as a natural fiber, which is extracted from the outside called the outer shell and is used to make carpets, mats, mattresses, ropes, nets, brushes, etc.The fluid in coconut endosperm, also known as coconut water

[2-3]. Coconut water is consumed in its natural form and is a refreshing, sweet drink in coconut fruit. It has been used in various parts all over the world because it can be used to treat oral health, cholera, diarrhea, fever, and vomiting, and it plays a vital role in helping the body obtain antioxidant properties [4,5,6].

In recent years, due to its various uses (such as snacks, bottles, oil, coconut cream, coconut milk, juice, cosmetics) [7]. Coconut is not only an isotonic drink, but also has traditional uses and traditional medicinal value.

2. Botanical Features

Coconut: *Cocos nucifera*

Family: Arecaceae

Subfamily: Cocoideae

There are two types of coconut trees tall and dwarf. Tall trees bear fruits 5 to 10 years after planting trees [8]. Its fiber, oil, and copra are of the best quality. The male flowers get mature earlier than the female flowers. It lives up to the age of 80 to 120years. The tall type cross-pollinates as it is highly cross-pollinated after the pollination occurs the nuts of the tree matures within 12 months.

The dwarf coconut tree grows fast bears fruits within 4 to 6 years of planting [8]. This variety gets pollinated by self-pollination as in this variety here the male and female phase overlaps. The color of the fruits is green, yellow, orange and red. The fruits of dwarf coconut are less hardy and also they require better climate conditions and soil type for their good quality yield of the crop.

3. Health Benefits

3.1. Isotonic Beverage

Hundreds of years ago, sailors in Melanesia, Micronesia and Polynesia used coconut juice and fruit endosperm as food and drinking water reserves [9]. Currently, coconut water is used as a refreshing drink, and the immature part of the nut is used by thousands of people in the tropics. The Brazilian market has a large coconut market involving long-life packaging [10]. Coconut water contains a lot of potassium, which plays a vital role in inside and outside the cell and maintains osmotic pressure. Semi-permeable membranes are found in living cells membrane. When cells are placed in solution at a high osmotic pressure, is called hypertonic. When water full of cells comes out and the cells wrinkle, this process is called plasmolysis. If external water enters the cell from outside to cause cell swelling, this process is called plasmoptysis, and if the cell is placed in lower osmotic pressure, it is called hypotonic [11]. Tender coconut water has natural health benefits and can provide energy to our body [12].

3.2. Medicinal Uses

Coconut water has many properties and is used mainly as a natural drink with various health benefits, its main function is also to be used as a therapeutic agent [13]. It is known for its Ayurvedic purposes, can be used for Ayurvedic purposes, and helps in “unctuous, sweet, increase semen, promote digestion, and cleanse the urinary tract” [14]. Coconuts are used in daily life in many areas. In a country like Sri Lanka, coconut plays an important role as a medical use [8]. It is used for various types of health problems, such as urinary tract infections, eye irritation, stomach problems, placental problems, diarrhea, etc. Natural drink also plays an important role in replenishing water, and people in remote areas can also use local habitat to survive during WWII [15-16].

3.3. Controls Blood Pressure

Coconut water helps in the blood pressure; it brings down systolic pressure factor [17]. The research proved that if fresh coconut water is consumed about 300-400ml twice a day for 14-15 days it helps to brings down systolic blood but the same process of intake is not in diastolic blood pressure [18]. Tender coconut water is effective in preventing dehydration in the body, helps in lessening the swelling of feet and hands, defending against Cancer, helps in maintaining a level of sugar in diabetics, helps in increase function of digestion, helps in constipation, helps to reduce cholesterol, helps to maintain blood pressure, helps in preventing arthritis, helps in improve circulation of blood, it maintains the good immune system, prevent blood clotting, it is antioxidant, due to its antioxidant properties it restores the skin's strength and elasticity, as well as its help in reducing wrinkles [19,20,21]. According to research, the use of coconut water can reduce the heart rate of patients with severe hypertension. The systolic blood pressure and diastolic circulatory blood pressure (BP) of the test group were reduced by 10.6 mm Hg and 6.7 mm Hg, respectively [22].

3.4. Cardio Protection

Epidemiological examination recommended that significant degrees of HDL can forestall coronary illness cardiovascular sicknesses like cardiac infarction, cerebrovascular accident [23]. The coconut water has cardiovascular effect in research of myocardial infarction induced in rats [24]. An important biological action of coconut is a significant natural activity that shows utilizing an exploratory model of myocardial localized necrosis actuated by isoproterenol in rodents. Taking care of these creatures with tender coconut water ensured the enlistment of cardiac infarction localized necrosis [25].

3.5. Biocatalyst

Coconut water shows up in the protein amalgamation from the recombinant DNA vectors (Bustamante, 2004).[26] The tender Brazilian's coconuts showed a high reduction reaction at a surrounding temperature in a progression of sweet-smelling ketones and aldehydes, recommending that coconut water are presumably underutilized in the common natural union examination field [27].

3.6 Development Mechanism for Plants & Microorganism

In the mid-1960, tender coconut water known to support the growth of microorganisms, especially the "coconut tree" (Nata *de* coco) microorganisms [28]. Nata de coco cellulose bacteria naturally exist at the interface of coconut water or air [29]. Coconut water is also used to process wine and is a traditional preparation method. [30]. Traditionally coconut water is used to prepare vinegar [31]. There is a certain amount of sugar in coconut water, which has the ability to ferment. Coconut milk, also known as coconut milk, is used to divide mature cells [32-33]. For example, spinach corn becomes heavier after 5-6 weeks, and the recovery of buds is accelerated due to the development of spinach tissue in 10% to 15% enhanced medium (from 4-5 weeks instead of 8-12 weeks) developed coconut water, which can expand the weight of spinach calluses after 5-6 weeks [34]. Many researchers have discovered that the growth factors in coconut water can also enhance the ability of different types of bacteria in plants and in vitro culture [35,36,37]. For this reason, it is believed that coconut water from young organic products produces better results than water developed from natural products.

3.7. Electrolytes

Coconut water contains electrolytes rich in essential inorganic elements, such as phosphorus (9.2 mg%), potassium (291 mg %), calcium (43 mg%), sodium (43

mg%), magnesium (9.9 %) and so on. All these ions present in the tender coconut water are related to the production of osmotic pressure in the blood [38]. Fresh coconut water contains a lot of potassium, which can help maintain blood pressure [39].

4. Pharmacological Properties

4.1. Anticancerous property

The outer covering of coconut is husk fibers from that part secretion of thick liquid is considered as a source for the medication of anticancer and the new source of anti-multidrug resist activities [40]. Identification of new compounds that is capable of overcoming mechanisms of resistance and leading to tumor cell death is of great importance for cancer therapy.

4.2. Antidiabetic property

Antidiabetic activity is due to its impact on pancreatic-cell regeneration through arginine, in coconut the kernel has the antidiabetic activity due to the protein content that is present in the kernel of coconut the by reversing level of glycogen, carbohydrate metabolizing enzyme properties, and pancreatic harm to normal levels [41]. In diabetic rats, Coconut water decreased the level of glycohemoglobin by increasing the level of insulin and liver glycogen concentrations. Furthermore, elevated levels of liver function enzymes markers like serum glutamate oxaloacetate transaminase alkaline phosphatase, and serum glutamate pyruvate transaminase was significantly reduced when diabetic rats were provided mature coconut water. Treatment with mature coconut water and glibenclamide changed the levels of serum creatinine, blood urea, and albumin in rats that are diabetic, and the globulin/albumin ratio was significantly reversed [42].

4.3. Antioxidant property

In antioxidant activities there is L-arginine (30 mg/dL) is a free amino acid found in Tender Coconut Water that helps to reduce the development of free radicals. Coconut Water contains vitamins like rich in vitamin C, which has been shown to the reduction of lipid per oxidation in rats [39]. When rat's diets are supplemented with VCO, the antioxidant enzymes increase. Fresh coconut water samples had the highest antioxidant activity [43]. Tender Coconut Water has the ability to increase the levels of antioxidant enzymes. By restoring antioxidant activity and suppressing inflammation, Acetaminophen induced liver damage has been reduced with the use of coconut water vinegar [44].

4.4. Antiviral property

The antiviral activity of cytomegalovirus, Visna virus, influenza virus, Epstein-Barr virus, pneumonia virus, leukemia virus, and hepatitis C virus are all lipid-coated viruses that coconut oil is very effective against of these all virus.These species are killed by the medium chain fatty acids in coconut oil, which alter their membranes and interfere with the maturation and assembly of the virus [45]. Monoglycerides are active against these viruses, while diglycerides and triglycerides are inactive. Among the saturated fatty acids, lauric acid has a higher antiviral activity than myristic acid, capric acid or caprylic acid. Monolaurate causes the virus envelope to break down by dissolving the phospholipids and lipids in the envelope [45]. The antiviral effects of FA and MG are additive and the total concentration is important for inactivation of the virus [46].

4.5. Antibacterial property

Coconut Water has a lot of properties and also has a variety of medicinal uses, as it includes a good amount of albumen and saline content in its water due to this

property it is good for the patient with cholera, as well as aiding in the treatment of urinary infections and diarrhea [38].

The most abundant and potent medium-chain fatty acid in coconut is lauric acid, which accounts for nearly half of the content of fats. By dissolving the lipid membrane of lipid-coated bacteria, derivatives of MCFAs, such as MGs found in coconut, are effective at killing them. They may be effective against bacteria that cause ulcers of the stomach, sinus infection, cavity, foodborne illness, and bladder infection.

4.6. Anti-inflammatory property

Coconut water has various properties of anti-inflammatory, the unusual properties of sugars, minerals, vitamins, cytokinin, and amino acids are found in coconut water can be due to the anti-inflammatory and observed in this study, as well as more biological activities of tender coconut water. In both adult and lactating rats, it lowers the threshold. Coconut water's anti-inflammatory properties can be attributed to its ability to inhibit prostaglandin activity; As a result, inflammation and discomfort are reduced. The study's findings indicate that coconut water has anti-inflammatory and analgesic properties that are time-dependent. Thermal sensation of pain in hot tail and plate immersion test models, as well as chemical noxious in acetic acid-induced writhing and in formalin-induced paw licking experiments, were used to demonstrate the analgesic property. Using the same anti-inflammatory effect was determined. Coconut water has anti-inflammatory properties [47].

Table 1.Traditional Uses

Since ancient times, coconuts have been used for many purposes and daily life, and they are also of great significance in traditional uses in different countries. The following are some important traditional uses:

PARTS USED	COUNTRY NAME	COMPOSITION USED	USES	REFERENCES
ROOTS	**Trinidad**	**As tea**	**Stomach pain & Diarrhea**	**[48]**
SOLID ALBUMIN PULP OF COCONUT	**Indonesia and Fiji**	**As oil**	**Used in wound healing and prevent hair loss**	**[49-50]**
	Ghana	**As milk**	**Treatment of diarrhea**	**[51]**
	Kenya	**As pulp**	**HIV-AIDS infections**	**[52]**
	Malasysia	**As decoction pulp**	**Treatment of fever & malaria**	**[53]**
	Fiji	**As water**	**Renal diseases**	**[50]**
COCONUT WATER	**India**	**As Religious purpose**	**Traditional use**	**[14]**
COCONUT SHELL	**Halti**	**As tea**	**Amenorrhea**	**[54]**

FIBER				
	Trinidad		**Treatment of venereal diaease**	**1976 [48]**
	Guatemala	**As extract**	**Inflammation of antipyretic kidney**	**[55]**
	Mexico	**As cream**	**Abscesses, injuries, burns & dermatitis**	**[56]**
INFLORESCENCE OF COCONUT WATER	**India**	**As tea**	**Treats the changes of menstrual cycle**	**[57]**

5. Conclusion

Coconut water is a different kind of juice. Due to its balanced sugar content, low acidity and isotonic solution composition, it is a potential hydrating and sports drink. Coconut tree is a widely distributed plant with important pharmacological effects and low toxicity. The medicinal uses of coconuts are widely spread in environments where they are widely used in the food industry. The pharmacological effects of plants depend on the part of the plant or fruit used. The antioxidant properties of coconut come from the shell of the fruit and coconut water. The total value of coconut exports from India is estimated to reach millions. It's no wonder that coconut culture continues to expand every day. India is now putting more emphasis and making the most of the potential and richness of this crop. In addition, coconut is an organic crop that can coexist with multiple plants. When planted with different crops, it can improve soil fertility and is also suitable for agriculture only when the crops are interspersed. Due to its wide range of uses, no matter where in the world the crop is grown, its prospects are promising.

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