

A CRITICAL REVIEW OF NARIKELA (*Cocos nucifera* Linn.)

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ABSTRACT

Cocos nucifera Linn., commonly known as coconut, is found in all tropical and subtropical regions. It is cultivated throughout the hot damp regions of India, particularly in coastal regions for its multiple utilities, nutritional and medicinal values. The coconut derives its names from the Portuguese word "coco", a mask and "nucifera" means nut bearing. It is a kind of palm tree with a single straight trunk. Every part of the coconut tree has a use, including the fruit, wood, and leaves. References to the drug *Narikela* can be found in *Brihatrayees*, *Laghutrayees* and *Nighantus*. *Ayurveda* has mentioned the use of *Narikela* in classical texts for the management of different disease conditions. It is also used as *Vajikarana* (aphrodisiac) and as *Rasayana* (rejuvenating agent). The properties of *Narikela* are *Madhura rasa* (sweet in taste), *Madhura vipaka* (sweet in the post digestive taste) and *Seeta Veerya* (cold in potency). It has a special potency (*Prabhava*) as it promotes hair growth. It alleviates *Vata* and *Pitta dosha*. The Fruit, Root, Flower, Fruit milk, Fruit pulp of *Narikela* are used as an ingredient in several Ayurvedic formulations, which are effective in many disease conditions. Coconut oil is a main ingredient in many Ayurvedic oils. In this article, an attempt has been made to compile the information related to *Narikela* from several *Samhitas*, *Samgraha Granthas*, *Nighantus*, other texts and publications.

Keywords: *Narikela*, *Cocos nucifera* Linn.

INTRODUCTION

Narikela is one of the classical drugs of herbal origin used in *Ayurveda* system. It is botanically identified as *Cocos Nucifera* Linn. It is a kind of palm tree with a single straight trunk and has been used for many purposes since prehistoric times. *Narikela* is also known as *Kalpa Vriksha* in *Sanskrit* which means "the tree which provides all the necessities of life". The coconut tree is ubiquitous throughout India and finds its use in the everyday life of all Indians. Several products are obtained from the coconut tree including coconut, tender coconut water, coconut toddy, coconut shell and all these are useful. The kernel of the fruit is

edible and yields edible and burning oil. The culinary use of the fruit is diverse; it is an integral part of many cuisines across the world. The leaves are plaited into mats and are used for thatching, fencing, partitions etc. The fibres of the pericarp are used for cordage and matting. The coconut is an essential element in many Hindu rituals too. The main parts used in the treatment of diseases are fruit, flowers, oil, water and root. The coconut water and coconut kernel contain various micronutrients which are useful for disease prevention and maintaining good health.

Literature Review

References regarding *Narikela* are found in classical texts of Ayurveda like *Susrutha samhitha*, *Caraka samhitha*, *Ashtanga hrudaya*, *Kaiyadeva nighantu*, *Bhavaprakasa nighantu*, *Rajanighantu*, *Dhanwanthari nighantu* etc. Modern text like *Dravyaguna Vijana* by P.V Sharma, *Dravyaguna Vijnana* by Jnanendra pandey, emphasize its action in various diseases. In *Caraka Samhitha* it is mentioned in the treatment of *Paithika chardi*. In *Chakradatta*, *Narikela* is mentioned in *Sula chikitsadhikaara*. *Bhava prakasa* mentioned *Narikela* for the treatment of *Amlapitha*. *Vaidyamanorama* mentions its usage for *Vrana* and *Krimi roga*. *Vrundamaadhava* explains its application in *Vipadika* and *Suryavartha*.

Text book such as *Dravyaguna vijnana* by Prof. P.V Sharma, *The Ayurvedic Pharmacopoeia of India*, *Ayurvedic Materia Medica* and other books written by recent scholars also give a lot of information regarding the habitat, chemical composition, therapeutic uses etc. of *Narikela*. The information available on *Narikela* including synonyms, properties, actions and various formulations consisting of *narikela* with their indication in Various *Samhitas*, *Nighantus*, *Samgraha* and other texts are compiled, critically analyzed and are presented here.

Synonyms: *Ayurveda* texts describe the morphological and pharmacological characteristics of *Narikela* through various *Paryaya* (synonyms).

Table 1: Showing Synonyms Of *Cocos Nucifera* Linn. In Various Literatures

Synonyms	K.N	R.N	G.P	JLN	IMP K.B)	D.N	IMM (AKN)	M.N	H.N	S.N	So.N
<i>Putodaka</i>	+										
<i>Thoyagarbha</i>	+										
<i>Rasaphala</i>		+				+					+
<i>Suthunga</i>	+	+				+				+	+
<i>Lathavriksha</i>	+										+
<i>Koorchasekhra</i>	+	+	+		+	+			+	+	+
<i>Drudaneeli</i>		+									
<i>Drudabeeja</i>	+							+			
<i>Mahaphala</i>	+							+			
<i>Neelatharu</i>		+									
<i>Tunga</i>	+		+	+	+	+			+		
<i>Mangalya</i>		+									
<i>Drudaneera</i>	+										
<i>Chocha</i>	+				+	+			+	+	
<i>Sadaaphala</i>	+		+		+		+		+		
<i>Langali</i>	+		+	+	+	+		+	+		+
<i>Uchatharu</i>		+									
<i>Tyaksha</i>	+									+	
<i>Trunaraaja</i>	+	+	+	+	+		+	+	+		
<i>Skandhatharu</i>	+	+	+		+				+		
<i>Dakshinathyaya</i>	+	+	+			+		+			+
<i>Duraaruha</i>		+									
<i>Vyambakaphala</i>		+									
<i>Drudaphala</i>		+	+	+	+			+	+	+	+
<i>Nagavruksha</i>						+					
<i>Neera</i>						+					

Vernacular names¹

The drug *Narikela* is ubiquitous throughout India and is known in India and outside the country by different

local names in respective regional languages. Table 2 lists some of the common names of *Narikela* in various languages.

Table 2: Vernacular names of *Narikela*

English:	Coconut tree, Coconut, Coconut palm
Hindi:	Nariyal, Narel, Gari, Giri
Bengali:	Dab, Narikel, Narival, Daav
Gujrathi:	Nariel, Nariel, Naricara
Kannada:	Tengu, Thenpinna, Kinghenna, Tengina, Tengina-gida, Tengina-kayi, Tengina Chippu, Thenginararu
Malyalam:	Tengu, Thenga, Narikelam, Thenmaram
Marathi:	Naral, Narula, Naralmad, Mad, Varala, Mar, Tenginmar
Punjabi	Narel, Khopa
Tamil:	Tenkai maram, Thennaimaram, Tenkai, Thenna, Thenga, Narikelam, Thennanchendi, Thenna maram, Thengay
Telugu	Kobbari, Cettu, Tenkaya-chettu, Narikelamu, Narikalam, Tenkaia,
Arabic:	Fadbirdal, Shajratan,- narijal, Shajratul jouse
Burmes	Ong, Ung, Ung-bin, Onti, Ondi
Persian:	Darakhte- nargil, Darakhte Bandinj, Nargil, Bodinj
Sing:	Pol-graha, Pol nawasi, Tambili

The classification of *Narikela* in various *Vargas* and *Ganas*². according to various *Nighantus* are

- *Amraphalaadi varga - Bhavaprakasa Nighantu*
- *Oushadhi varga - Kaiyadeva Nighantu*
- *Phala vargam - Charaka Samhitha*
- *Phala vargam - Madanapla Nighantu*
- *Vanoushadhi vargam - Amarakosam*
- *Phalavargam - Hareethakyadi Nighantu*
- *Amradi panchamo vargam- Dhanwanthari Nighantu*

- *Hareethakyadi vargam -Priya Nighantu*
- *Madhura dravya skandham - Sadrasa Nighantu*
- *Amraadi vargam - Sodhala Nighantu*

Narikela possess *Madhura rasa, Guru snigdha guna , Seeta virya, Madhura vipaka* and *Vata Pitha Samaka* property³. Based on the properties this drug shows various *Karmas* (Actions) which are beneficial to the body. Table 3 lists some of the *Karmas* of *Narikela* as mentioned in classical *Ayurveda* text books.

Table 3: Showing *Karma* of *Narikela* (Cocos nucifera Linn.)

<i>Karma</i>	K.N	R.N	G.N	JLN	IMP(K.B)	DN	IMM(AKN)	MN	HN	SN
<i>Brumhana</i>	+	+	+	+	+	+	+		+	+
<i>Guru</i>		+	+	+		+		+		+
<i>Snigdha</i>	+	+	+	+				+	+	+
<i>Pithaghna</i>		+		+				+		
<i>Sita</i>	+	+	+	+	+		+	+	+	+
<i>Balamaamsapradam</i>		+		+		+			+	+
<i>Balya</i>	+						+			+
<i>Hrudya</i>		+				+			+	
<i>Basthi sodhana</i>		+		+	+	+	+		+	+
<i>Rakta prasadana</i>			+							
<i>Vishtambi</i>			+		+	+				+
<i>Kapha sukrakrul</i>			+			+				+
<i>Vrushya</i>				+	+		+			+
<i>Durjjara</i>					+	+				+
<i>Tarpaka</i>						+				
<i>Pachaka</i>						+				

There are various indications of *Narikela* mentioned in classical Ayurveda literature. The main indications mentioned in *Samhitas* and *Nighantus* are in *Kesa vikara* – *Khalithya*, *Palithya*, *Masurika*, *Charmaroga*, *Kushta*, *Vruna*, *Trsna*, *Daha*, *Amlapitha*, *Amasayak-sobha*, *Parinamasula*, *Annadravasula*, *Gulma*, *Athisara*, *Rakthapitta*, *Hikka*, *Mutraghatha*, *Mutrak-ruchra*, *Mutravaivarnya*, *Kashtarthava*, *Vajikarana*, *Vishamajwara*, *Adhmana*, *Dourbalaya*, *Krusatha* and *Ksayaroga*.

Therapeutic uses of Narikela⁴

1. Unfermented juice taken twice or thrice weekly during pregnancy reportedly has marked effect on the colour of infant.
2. Milk of kernel of *Narikela* mixed with *Kalijeera* is locally applied to freckles.
3. Milk of fresh coconut kernel can be used in debility, incipient phthisis and cachexia, in doses of 4 – 8 ounces thrice daily.
4. Fresh oil prepared by boiling the milk of coconut is useful in treating baldness as it promotes the growth of hair and also in burns.
5. Milk or water of the fruit is a cooling refrigerant drink useful in urinary disorders.
6. The cleared shell of the nut or portions of it are burnt in a fire and while red hot, covered by a stone cup. The fluid which is deposited in the inferior of the cup is rubefacient and is an effectual domestic remedy for ring worm.
7. Parched grain flour mixed with equal sugar and taken with coconut water alleviates severe acidity, palpitation of heart, thirst, fainting, giddiness, etc
8. Coconut water mixed with *Hingu* can be used in *Udarakrumi*
9. Raw rice kept inside the coconut (by making a hole) until it is decomposed and applied locally cures *Vipadika*.
10. Water of unripe fruit is useful in *Trishna*, *Jwara* and *Mootra Vikara*
11. In *Suryavartha* and *Ardhavabhedaka*, intake of milk with coconut water is found to be beneficial.
12. If one takes flowers of coconut with milk, he becomes free from gravels (*Sarkkara*) within a few days.

13. In *Chardi*, intake of water of *Narikela* fruit is beneficial.

Visishta yoga

Narikela is the main ingredient in the following Ayurveda formulations.

Bruhat Narikela khanda - useful for treating *Amlapitha*.

Narikela kshara - useful for treating *Sula roga*

Narikela lavana - useful for treating *Parinama sula*

Narikelasava - useful for treating *Vajikarana*

Narikeladiyoga - useful for treating *Mutrakrichram*

Narikeladipanam - useful for treating *Mutrakrichram*

Narikelambwadi yoga - useful for treating *Murcha*

Narikelamrutham - useful for treating *Amlapitha*

Narikela pushpadi yogam - useful for treating *Striroga*

Taxonomy⁵

Kingdom - Plantae

Sub kingdom - Viridae plantae

Infra kingdom - Streptophyta

Division - Tracheophyta

Sub division - Spermatophytina

Infra division - Angiospermae

Class - Magnoliopsida

Super order- Lillanae

Order - Arecales

Family - Arecaceae

Genus - Cocos

Species - Cocos nucifera

Botanical description of Cocos nucifera Linn.

Stem is tall and slender, curved or straight, 40-80 ft height and marked with ring like leaf scars. Leaves are 6- 15 ft long and pinnatisect in nature. Leaflets are numerous, 2-3 feet long and in linear lanceolate shape. Petioles are 3-5 feet long and stout. Spadix is 4-6 ft long and lower spathe is 2-3ft long. Fruits are 8-12 cm in long and large ovoid terete or trigonous in shape. It is one seeded and pericarp is thick and fibrous. Endocarp is bony or stony with 3 based pores and the cavity containing a potable milky fluid. Wood is hard, red outside, reddish brown and softer within.

Distribution, propagation and cultivation

Cocos nucifera Linn. is found in all tropical and subtropical regions. Usually found sea level to 150 m, but

will grow at 0-600 m near the equator. It grows in many habitats from areas of human habitation to sandy beaches. It is cultivated throughout the hot damp regions of India. Particularly in coastal regions of Orissa, Bengal, Gujrat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andra pradesh and N. Andamans.

The primary requirements for the successful cultivation of coconut palm are hot tropical climate, abundant rainfall and well drained soil. Sea shores, river banks, and hill slopes in tropic afford ideal situations. The coconut palm thrives best in regions with a maximum temperature of 85 degree F with a diurnal variation of 12 degree F. the palm prefers a well distributed rainfall of 125- 225 cm per annum. Coconut palm is propagated by seedling and raised from fully mature fruits.

Under favourable conditions coconut palms begin to yield fruits 5-6 years after planting and gives full yield from 10th year onwards. The fruits are harvested only when they are fully mature, unless tender nuts are specially required.

Microscopic characteristics of endosperm of Cocos nucifera⁶

Endosperm shows testa, consisting of irregularly arranged, brown, compact, parenchymatous cells. Beneath testa a very wide zone, consisting of outer 2-3 layers, thin-walled, smaller and angular Parenchymatous cells followed by containing numerous aleurone grains, raphides, prismatic crystals of calcium oxalate and oil globules

Chemical constituents⁶

Presence of phenol, p-cresol, caproic acid, and p-hydroxy benzoic acid in shell fibres are detected by TLC. In addition, tar from shells contained crotonaldehyde, furfural and acetic acid. Albumin, globulin and prolamine fractions of coconut were separated, hydrolyzed and amino acid is analysed. Albumin fraction composed of aspartic and glutamic acid, alanine, serine, threonine, valine, leucine, isoleucine, methionine, cysteine, proline, and hydroxyproline. Globuline fractions contained lysine and arginine. Prolamine fractions contained aspartic acid, glutamic acid, serine, threonine, alanine and valine coconut endosperm. Coconut milk contains histidine, arginine, lysine, tyro-

sine, tryptophan, proline, leucine and alanine. coconut oil contains oil lauric, myristic, fatty acids, mixed glycerides, such as caprylic lauric myristic, dilauromyristin, lauro dimyristin, dimyristopalmitin and dipalmitostearin, undecanoic and tridecanoic.

Pharmacological description of Cocos nucifera Linn.

Various parts of coconut have antiviral, CNS depressant, antihypertensive, antibacterial, anticancerous, antifungal, hypolipidemic, diuretic, antibiotic, immunologic, anticonvulsant, antidiabetes, antitubercular, anti-inflammatory, antiarthritic, antipyretic, anti-helminthic, antidiarrheal properties etc^{7,8}. Parts of *Narikela* are used as *Ayurveda* medicines in various forms such as *Kwatha*, *Lepa*, *Avaleha*, *Taila*, *Vati*, *Ghrita*, *Churna*, *Dhuma*, *Asava* etc⁹. *Narikela* is proven to be useful for treating disease conditions such as *Mutraroga*, *Shula*, *Charma roga*, *Mutrak-ruchcha*, *Prameha*, *Amlapitta*, *Raktapitta* etc. The following section mentions some studies which were conducted to assess the therapeutic effectiveness of *Cocos nucifera* Linn.

A clinical trial was conducted on 31 cases of dermatophytosis to assess the effect of coconut shell extract in 2% petroleum jelly as external application. The studies carried out for 4 weeks with the follow up of 3 months revealed that out of 31 cases 24 cases got completely cured without relapse of complaints. Four cases which did not respond developed flare up of the symptoms during the second week of treatment. The drug showed significant antifungal activity.

A Clinical study was done on 20 patients who were treated with *Narikela Sukthi Choorna* as an external application. The duration of treatment was 15 days and the patients were assessed on 7th and 15th days. The effects of treatment were analysed statistically on the basis of gradation of cardinal signs and symptoms, before and after the treatment. The results show that the effect of *Narikelasukthi Choorna* as an external application is statistically significant for the disease *Mukhadooshika* in symptoms like *Vedana*, *Kandu* and *Vaivarnya* and *Srava*¹⁰.

In a comparative study of intravenous use of natural coconut water, synthetic coconut water and glucose saline in gastroenteritis was carried out on 40 patients.

A total of 45 infusions were given, 16 of natural coconut water, 14 of synthetic coconut water and 15 of glucose saline. An average quantity of infusion required to cure dehydration and prostration was found 432 ml of natural coconut water, 612 ml of synthetic coconut water and 1910 ml of glucose saline¹¹.

In another study, the cardioprotective action of tender coconut water (TCW) in experimental myocardial infarction induced by isoproterenol in rats was studied. The results indicated that feeding Tender Coconut Water afforded protection against induction of myocardial infarction¹².

In a study to investigate the effect of regular consumption of two tropical food drinks, coconut (*Cocos nucifera*) water and mauby (*Colubrina arborescens*) on the control of hypertension, Twenty eight hypertensive subjects were assigned to four equal groups and their systolic and diastolic blood pressures recorded for two weeks before and then for another two weeks while receiving one of four interventions: bottled drinking water (control group), coconut water, mauby and a mixture of coconut water and mauby. Significant decreases in the mean systolic blood pressure were observed for 71%, 40% and 43% respectively of the groups receiving the coconut water, mauby and the mixture ($p < \text{or} = 0.05$)¹³.

Another study was carried out to evaluate the potential of *C. nucifera* as antipyretic, anti-inflammatory and wound healing agent. The fresh juice of *C. nucifera* was directly used while its aqueous kernel extract was obtained after 72 h soaking of 1:2 (w/v) fresh kernels in 2:1 (v/v) chloroform: methanol. The extracts, in the concentrations/strengths of 10, 50 and 100%, were used in the anti-pyretic and anti-inflammatory studies while those in the concentration of 100% were used only in the wound healing study. The fresh juice and aqueous kernel extract of *C. Nucifera* exhibited significant ($p < 0.05$) anti-inflammatory and antipyretic activities and promote wound healing with the latter producing a more effective effects in all assays used. This finding has scientifically supported the folkloric use of *C. nucifera* in the treatment of inflammation, pyrexia and wound¹⁴.

In one study, warm water crude extract of coconut milk and coconut water dispersion were investigated

for their antiulcerogenic effects in male Wistar albino rats. The ulcer inhibition rate (UIR) was taken as a measure of the cytoprotection offered by test substances. Coconut milk (2 mL daily oral feeding) produced a 54% reduction in the mean ulcer area and coconut water produced a 39% reduction in the mean ulcer area. The effect of coconut milk was similar to the effect of sucralfate, which is a conventional cytoprotective agent that reduced the mean ulcer area by 56% in this study. The results showed that coconut milk and water via macroscopic observation had protective effects on the ulcerated gastric mucosa¹⁵.

The coconut water too has many nutritional and therapeutic properties and a study was conducted to assess the beneficial effects of coconut water feeding on lipid metabolism in cholesterol fed rats. Coconut water is a natural, acid and sterile solution containing several biologically active components, l-arginine, and ascorbic acid, minerals such as calcium, magnesium and potassium, which have beneficial effects on lipid levels. The laboratory study showed that both tender and mature coconut water feeding significantly ($P < 0.05$) reduced hyperlipidemia in cholesterol fed rats¹⁶.

Another study evaluated the hypolipidemic effect of coconut water (4ml/100g body weight) with a lipid lowering drug, lovastatin (0.1/100g diet) in rats fed with fat-cholesterol enriched diet ad libitum for 45 days. The study concluded that Coconut water has lipid lowering effect similar to the drug lovastatin in rats fed with fat-cholesterol enriched diet¹⁷.

CONCLUSION

Narikela (*Cocos nucifera* Linn.) is found throughout India and its description can be traced since Samhita period. In *Ayurveda*, *Narikela* is attributed with pharmacological properties of *Madhura rasa*; *Madhura vipaka* and *Shita virya*. It is used both externally and internally in different forms and in many classical formulations for treating various diseases. It can also be used as *Vajikaran*, *Rasayana* etc. The coconut tree is a gift from nature to mankind. More research into *Cocos nucifera* Linn. should be encouraged considering its diverse pharmacological properties and potential therapeutic uses.

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