

Research On Formulation and Evaluation of Syrup From Carissa Carandas

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OBJECTIVE

1. To study assessed the Formulation & Evaluation of Carissa Carandas Syrup.
2. To establish simple Formulation of Carissa Carandas Syrup by using adjuvant Sugar & Lemon juice.

ABSTRACT

This study assessed the Formulation and Evaluation of Carissa Carandas Syrup. A study was conducted for the Formulation & Evaluation of Carissa Carandas. Syrup by using adjuvant Sugar & Lemon juice. Karonda (Carissa carandas), a fruit of dryland which is a widely grown indigenous shrub in India and is able to flourish in marginal and wasteland where other crops of commercial importance are unsuitable. Collection, conservation and evaluation, a process of crop improvement for characterization and selection of elite plants, are being successfully performed in different parts of India and standardized its vegetative technique of propagation. Its fruits have been utilized in processed products such as in the preparation of jam, jelly, squash, syrup and chutney and is in great demand in the international market. Carissa carandas Linn. (Karonda) a native plant of Indo-Malaysia is best known for its fruits, which contain about 75 percent juicy edible pulp. The acidic pulp is a common ingredient in culinary preparations such as condiments, curries, beverages, jams in countries where the plant grows naturally. The fruit is pickled in salt solution which is rich of minerals, acids, phenolic compounds, terpenoids, vitamins, peptides and sugars. Ripe fruit is full of acids and micro and macro nutrients which combine well with sugars, and used to prepare a variety of jam. It is now considered as a valuable source of several unique products for the medicines against various diseases and also for the development of some industrial products. The present review includes comprehensive information on the chemical constituents, traditional uses, pharmacological

actions and nutraceutical promotion and publicity in the international market.

KEYWORD: -karonda, hedge plant, rainfed crop, fruit products, Carissa carandas, processed product, nutraceutical potential, photochemistry, pharmacological activities.

I. INTRODUCTION

Carissa Carandas (F. Apocynaceae) is an important, exotic, minor fruit commonly known as Karonda 'Christ's thorn' which grows wild in bushes. In India it is cultivated in a limited way in the tropical and subtropical Mediterranean region. It is widely used medicinal plant by tribals throughout India and popular in various indigenous system of medicine like Unani, Ayurveda and Homoeopathy. Traditionally the plant has been used in the treatment of scabies, intestinal worms, diarrhea, intermittent fever and reputed for its aphrodisiac, antipyretic, appetizer, antiscorbutic, anthelmintic, and astringent properties. Karonda is inhabitant and widespread throughout much of Burma, India and Malacca and dry areas of Ceylon; is rather generally cultivated in these areas as a hedge and for its fruit and the fruit is marketed in urban area.

There are about 30 species in genus the Carissa being native of tropics and subtropics of Asia, Africa and Australia; four species in China. It is a perennial plant and very easily maintained a hardy shrub, usually growing up to 12 (4-5 m) high. The plant produces abundant whitish pink berrysize fruits in the monsoon tropical climate. The fruit is simple, succulent, globular, 14-18 mm diameter. The epicarpis thin, whitish pink and of maroon colour when ripe. Mesocarp is acidic so the moist but not juicy. After drying the fruit is shrunk and changed to dark brown colour. The fruit exudes much gummy latex when being cooked but the rich-red juice becomes apparent and is used in cold beverages. The sweeter types may be eaten raw but the more acid ones are best stewed with plenty of sugar. The alcoholic extract of the roots of C. carandas had

been re-reported to possess cardiogenic activity and antihypertensive activity. The ripe fruit is cooling and acidic; used to treat sore throat, mouth ulcer and skin disorders. The fruits possess significant amount of jelly grade pectin therefore a large number of factories have been built for making commercial jelly/jam and a product name 'Nakal cherry' which closely resembles the canned cherry fruits. Equal quantity of fresh leaves, fruits and roots bark is grounded and taken once a day with water for eight days for the permanent cure of piles. The plant is used as component in a number of ayurvedic formulations, which includes: HridyaHahakashaya, MarmaGutika, Kalkantaka Rasa, Kshudrakarvanda Yoga and MarichadiVati. Ethanolic extract of the plant root has been reported for histamine releasing activity used to assess the intensity of snake poisoning. Chemical investigations on *C. carandas* had led to the isolation of several substances including β -sitosterol, lupeol, mixture of cardenolides, carissone and a new

Traditional uses

The plant is commonly used as a condiment or additive to Indian, spices and cold beverages. The sweeter types may be eaten raw but the more acid ones are best stewed with plenty of sugar. Unripe fruit is good appetizer; astringent, antiscorbutic, cooling, acidic, stomachic, anthelmintic and leaf decoctions are given in the commitment of remittent fever. Leaf extract is externally applied for curing lep-rosy. Two drops of plant oil is given with half cup of honey for controlling worms of minors. Traditional healers of Chhattisgarh use the different plant parts to cover the cancerous wounds and to kill the maggots. Karonda is mainly used for making pickle, jelly, jam, squash, syrup and chutney at industrial scale.

The ripe fruit emits gummy latex when it is cooked, but yields a rich red juice which becomes clear when it is cooled, so this is used as a refreshing cooling drink in summer. It is also sometimes substituted for apples to make an apple tart, with cloves and sugar to flavor the fruit. In many part of India fruits are commonly caring with green chilies to make a tasty dish taken with chapattis. In Konkan, India, root is pulverized with horse urine, lime-juice and camphor as a remedy for the itch.

Phytochemical constituents

Methanolic extracts of the fruit showed the presence of reducing sugar, protein, cardenolides,

terpenoids, steroids, phenolic compounds, saponins and acids. The chemical investigations of *C. carandas* had led to the isolation of several substances including β -sitosterol, glucosides of odoroside-H, ursolic acid and a new cardioactive substance. The leaves were reported to have triterpenoid constituents as well as tannins, and carissic acid. Fruits contain a mixture of volatile principles like 2-phenyl ethanol, linalool, isoamyl alcohol, β -caryophyllene, benzyl acetate, carissol and lanost-5-en-3 β -ol-21-oic acid. It also contains a mixture of sesquiterpenes, namely carissone and carindone as a novel type of C₃₁ triterpenoid, a new lignancarinol and carinol dimethyl ether diacetate. Various fatty acids such as 66.42% palmitic acid, 9.36% stearic acid, 2.04% oleic acid and 0.99% linoleic acids were found in the seed. Reducing sugar glucose, galactose as well as amino acids serine, glutamine, alanine, valine, phenylalanine has been reported in the fruit.

Pharmacological activities. *C. carandas* is known to possess extensive range of phytochemicals in its fruits that impart enormous medicinal value to the plant. These active constituents over medicinal value to the plant. Pharmacological importance of the plant fruits has been evaluated by several researchers through in vitro and in vivo advances. These activities of *C. carandas* have been reported from the crude extract and their different fractions and isolates from fruit, leaf and root.

Anti-inflammatory and anti-pyretic activity: Methanolic extract of *C. carandas* leaves reduced the edema induced by histamine, carrageenan and dextran in rat hind paw at the dose of 200 mg/kg b.w. It exhibited maximum inhibition of inflammation, i.e., 72.10%, 71.80 and 71.90

% at the end of 3 hrs. with histamine, carrageenan and dextran induced rat paw edema respectively. The methanolic extract of *C. carandas* leaves at the dose of 100 and 200 mg/kg showed significant reduction in yeast induced increased temperature in a dose dependent approach and the effect also extended up to 4 hrs. after the drug administration.

Anti-oxidant activity: *C. carandas* is found to be a very potent antioxidant. The results suggest that *C. carandas* fruit extract was the most potent antioxidant as it exhibited exceptional reducing power, scavenging activity against Nitric oxide, DPPH and peroxide radicals. Good correlation was observed with radical scavenging activity of extracts, and total phenolic content. All the antioxidant activities were compared with standard antioxidant such as ascorbic acid. Methanol extract exhibited the highest free radical scavenging

activity at tested concentrations. High scavenging activity was observed with aqueous extract while petroleum ether and chloroform extract showed poor antioxidant activity. Total phenolics were determined using aluminum chloride and FolinCiocalteu colorimetric method respectively.

Anticancer activity: The extracts of *C. carandas* fruits in chloroform, n-hexane and methanol were screened for their anti-cancer activity on the lung cancer cells and human ovarian carcinoma cells. All extracts showed excellent anti-cancer activity. Further, anti-cancer and antioxidant potentials of the extracts were analyzed by unusual antioxidant enzymes such as catalase, dismutase, superoxide, glutathione-s-transferase and glutathione on MCF-7 cancer lines. This study exhibited significant antioxidant activity, and induction of cell death in MCF-7 cell line pretreated with *C. carandas* extracts. The researchers suggested the potential anticancer value of this medicinal plant fruit for future development of therapeutic drugs. Furthermore, in-Vitro Anti cancer studies showed that aqueous ethanolic fruit extract (AEE) induces cytotoxicity at 800g/mL on HeLa cancer cells maintained in Dulbecco's Modified Eagle's Medium (DMEM). The study concluded that, regular daily intake of fruits in diet suggested with reduced risks of infectious diseases and cancer.

Anti-diabetic activity: Anti-diabetic activity of *C. carandas* leaves are evaluated on alloxan induced and normoglycemic Wistar rats, and it was found that the doses of 500 and 1000 mg/kg of the drug significantly ($P < 0.05$) reduced the blood glucose level of alloxan induced diabetic rats at 4, 8 and 24 hrs. Both doses of plant extract had significant ($P < 0.05$) hypoglycemic as well as anti-hyperglycemic property. Further, methanolic extract and its fraction of fruits were evaluated for anti-diabetic activity in alloxan induced diabetic rats. It is reported that the methanol extract and its ethyl acetate soluble fraction have significantly lowered the increased blood glucose levels at dose level of 400 mg/kg 24 hrs., as compared to diabetic control. The researchers accomplished that the anti-diabetic potential of ethyl acetate portion over methanol extract is due to its partial purification achieved by fractionation which resulted in increase of the polymerization, and separation of secondary metabolites and phenolic compounds.

Hepatoprotective activity: Ethanolic extract of roots of *C. carandas* showed significant hepatoprotective activity against paracetamol

induced and carbon tetrachloride hepatotoxicity by declining the activities of serum marker lipid peroxidation and bilirubin and significantly amplifying the levels of glutathione, uric acid, superoxide dismutase and protein.

Cardiovascular activity: The ethanolic extract of roots of *C. carandas* exhibited cardiostimulatory activity and lowered the blood pressure. The cardiac activity of plant has been recognized to the presence of water-soluble glucosides known as odor side. The dose 45 mg/kg, i.p. caused significant (50.75%) decrease in arterial blood pressure ($P < 0.001$) and the frequency of heart rate was also reduced significantly. It was also found that the ethanol extract of plant possesses potent hypotensive effect in normal rats.

Anti-malarial activity: Methanolic and aqueous extracts of leaf, stem bark and fruit of the plant *C. carandas*, tested against *Plasmodium falciparum* 3D7 strain. Both aqueous and methanolic extract exhibited promising anti-malarial activity (IC₅₀ ranged between 41.52 and 100 g/mL) and (IC₅₀ ranged between 13.57 and 69.63 g/mL).

The cytotoxicity of host cell was also analyzed on Madin-Darby canine kidney cell line by means of the MTT test that exposed no cytotoxicity in maximum dose tested.

Anthelmintic activity: The different concentrations (50, 100, and 150 mg/ml) of fruits extract *C. carandas* in solvent petroleum ether, ethanol and chloroform were evaluated in vitro anthelmintic potency on *Pheretima posthuma* by determination of time of paralysis and time of death of the worm. Piperazine citrate (15 mg/ml) was used as standard drug. It was concluded that the fruits extract of *C. carandas* causes earthworm paralysis and also its death after some time.

Antiviral activity: The ethanolic fruits extract of *C. carandas* possess effective antiviral activity against polio virus.

Antimicrobial activity: The ethanolic extract of fruit has powerful antibacterial action against different test bacteria like *B. subtilis*, *S. aureus*, *E. coli*, *S. faecalis*, *S. typhimurium* and *P. aeruginosa*. Moreover ethanolic extract has also showed extensive anticandidal action.

Adaptogenic activity: The ethanolic fruit extract and lanostanetripenoid isolated from the *C. Carandas* ethanolic extract were screened for adaptogenic activity using swimming endurance, anoxia stress tolerance and cyclophosphamide induced immunosuppression model. The levels of RBC, Hb, WBC, organ weight and body

weight suppressed by cyclophosphamide were estimated. It was observed that extract and lanostanetriterpenoid significantly increased the swimming endurance, anoxia stress tolerance and normalized the RBC, Hb, WBC, changed organ and body weight ($P < 0.05$ and $P < 0.01$) suppressed by cyclophosphamide demonstrate that extract and isolated compound showed significant adaptogenic activity.

Processed product of *Carissa carandas*

Carissa carandas fruit is full of calcium, iron, vitamin C, vitamin A, and other nutrients used as food and treatment of many ailments like anorexia, diarrhea, anemia, blood sugar stabilization etc. (Fig. 2A). It freezes well and can also be kept in the fridge for long time or pickled in brine or canned with sugar.

Ayurvedic formulations: The plant is used as ingredient in a number of ayurvedic formulations and preparations. Marmagutika used in the treatment of vital organs, like diseases related to heart, brain, urinary system. Hridayamahakashaya is employed in the treatment of heart disease. Kalkantaka rasa, 'juice' or 'essence' used for mental disease. Marichadivati used in the treatment of diseases of respiratory conditions and black pepper is the first ingredient of this medicine.

PLANT DESCRIPTION

Carissa carandas is an evergreen deciduous small to big shrub height 2-4 m tall. The stem is rich in white latex and the branches contain sharp spines. Flowers are small, diameter of flower 3-5 cm, with white color. The fruit is a berry, which is formed in clusters of 3-10 fruits. Fruits are pinkish white and become red to dark purple when ripe. Ripe fruit color from white, green and pinkish red depending on the genotype. Flowering month January-February and fruits mature in May-June. Fruits are generally harvested at immature stage for vegetable purpose, fully ripen fruits are consumed fresh or processed. The leaves are oblong and conical, 4-6 inch long and 23 inch wide, green on the top and brown below. Flowers: White or yellowish flowers are found in groups. Fruit: They are avoiding with 5-1 hard angles curving upwards, glabrous with five to seven wings, woody and fibrous. Bark: The bark is smooth gray. The bark is thick.

Nutritional value of Karonda Fresh and Dried Fruits

Taxonomical classification

Kingdom-Plantae

Phylum-Magnoliophyte

Class-Magnoliopsida

Order-Gentianales

Family-Apocynaceae

Genus-*Carissa*

Ingredients

Karonda/ Bengal currant- 400gm

Sugar-2 cups

Water-2 cup

Lemon juice- 1 tablespoon

Overview

Preparation process: **15 minutes**

Cooking process: **15 minutes**

Course: **Beverages** Yield: 250ml syrup

Formulation of Karonda/Carunda Squash

Step-1 Wash ripened Karondas thoroughly in cold water. Soak them in clean water for 10 minutes to soften them.



Step-2 Drain out the water from the Carondas and collect them in a mixer grinder.



Step-3 Add 1/2 cup of water to the grinder.



Step-4 Blend them together to make a pulpy fruit mixture.



Step-5 Take a strainer and pass the pulpy mixture from it. Sieve gently to get a smooth and seedless pulp.



Step-6 Heat a non-stick pan. Add 2 cups of sugar and 1 and 1/2 cups of water to it. Boil until the sugar gets dissolved completely in the water.



Step-7 Add prepared fruit pulp mix to the sugar syrup and cook for 5-7 minutes. Keep stirring the syrup.



Step-8 Afterward, add two drops of red food color to yield a beautiful look of the drink and keep boiling.



Step-9 Cook for another few minutes and finish it by adding Lemon juice.



Step-10 Keep the mix aside to cool completely. Once cooled, fill it in a bottle.



Karonda as Medicinal Trees

The karonda fruit is an astringent, antiscorbutic and as a treatment for biliousness and beneficial for therapy of anemia. In traditional medicine the fruit is used to improve female libido and to remove worms from the intestinal tract. The fruits have anti-microbial and antifungal properties and its juice used to clean old wounds which have become infected. The juice may be carried out to the pores and skin to alleviate any pores and skin problems. Traditionally Karonda has been used to deal with anorexia and insanity. A leaf decoction of Karonda is used towards fever, diarrhea, and earache. The roots function a stomachic, vermifuge, treatment for itches and insect respells.

Medicinal properties of Carissa carandas

Various parts (fruits, leaves, bark and roots) of Carissa carandas are popular for their medicinal use in diarrhea, constipation, malaria, epilepsy, neurological disorder, pain, myopathic spasms, leprosy, anorexia, cough, pharyngitis, diabetes, seizures, scabies.

Health Benefits of Karanda

The complete plant has medicinal values. Carissa carandas flowers are used to remedy diverse diseases. It is very high source in iron, vitamin C, vitamin A, phosphorus and calcium. Anemic disease is controlled by iron found in Karonda. Vitamin C is found in high amounts in Karonda. By which scurvy disease is controlled. Karonda fruit has an Anthelmintic effect within the body which expels the Parasitic Worms. It

eliminates impurities from the blood. Eating Karonda mature fruit removes the disease of anorexia. Epilepsy disease controlled by the use of Karonda leaves. Abdominal pains, dysuria, menorrhagia and ulcer are controlled using the root of Karonda. It is fine in decreasing the blood sugar quantity in curing Diabetes

Other Uses

The ripe fruit emits a gummy latex when it is cooked, but yields a rich crimson juice which clears when it is cooled, so that is used as a fresh cooling drink in warm weather. Usually, the fruit is pickled earlier than it receives ripened. Ripe Karonda fruit carries excessive amount of pectin consequently it's also utilized in making jelly, jam, squash, syrup, tarts and chutne

Varietals Development of Karonda

There are no well established varieties of karonda although the cultivated types are classified according to fruit colour a green-fruited, pink-fruited and white-fruited by Singh (1969). However, the differences in shape and size of fruits are limited across all three types. At Konkan krishiidyapeeth (KKV), Dapoli, three plants namely No. 2, No. 5 and No. 2 (from another location) were reported to be promising by Bhagwat (1984). Kumar and Singh (1993) also reported that in eastern Uttar Pradesh (India) identified 4 types of fruit, viz. green, white with pink blush, green with purple blush and maroon. Average fruit weight ranged from 1.6 to 4.7 g and average number of seeds per fruit from 5 to 11. Wide variation was also observed in the biochemical composition of the fruit, with total soluble solids ranging from 3 to 4.5%, ascorbic acid from 10.26 to 17.94 mg/100 g, reducing sugars from 0.93 to 2.4% and non-reducing sugars from 0.57 to 1.33%.

Ayurvedic formulations

The plant is used as ingredient in a number of ayurvedic formulations and preparations. Marmagutika used in the treatment of vital organs, like diseases related to heart, brain, urinary system. Hridyamahakashaya is employed in the treatment of heart disease. Kalkantaka rasa, 'juice' or 'essence' used for mental disease. Marichadivati used in the treatment of diseases of respiratory conditions and black pepper is the first ingredient of this medicine.

II. DISCUSSION

The underutilized, edible raw fruits of *Carissa carandas* from the north eastern region of India were investigated for their nutraceutical and therapeutic potential. A thorough nutritional characterization of this fruit demonstrated it as a source of energy, natural antioxidants, phenolic compounds and minerals. It is a major source of ascorbic acid, iron, calcium, phosphorus and other nutrients. It has diverse pharmacological activities like anti-inflammatory, antipyretic, antioxidant, anticancer, antiulcer, antidiabetic, hepatoprotective, cardiovascular, antimalarial, anthelmintic, antiviral, antimicrobial and adaptogenic activity. The plant *Carissa carandas* easy to cultivate, free of serious pest and disease and its can be utilized as food or parts of food may provide medical health benefits including the prevention and or treatment of diseases. The bioactive ingredients of the plant fruits protect or promote health whether delivered from raw fruits, or processed foods, dietary supplements, extracts, beverages or other products. Phytoconstituents of the fruit i.e. organic acid, minerals, steroids, terpenoids and vitamins can act against allergies, tumors, ulcers, platelet aggregation and hypertension. Over the centuries, this plant has served as a major source of medicines for treating dysentery, anemia, diarrhoea, and prevention of diseases of mankind. There is an information gap on utilization, development and diversification required for commercial exploitation in Asian and African countries.

III. CONCLUSION

Karonda is relatively a new item yet to explore the full potential and a fruit that needs promotion and publicity in the international markets. It has been identified as a new addition to the available tropical fruit range with multiple uses. The demand for this fruit is limited mainly due to lack of awareness on food value of the fruit, its uses and non availability of organized supply. Therefore it is necessary to established large scale cultivation units where sizable quantities are made available for market promotion. Market promotion should focus mainly to create awareness on quality attributes nutritional value health value multiple uses etc. to introduce a product in the local and overseas markets. The plant fruits have played a prominent role in the diet and medicine of human beings, particularly in the tribal and rural areas of the country, for thousands of years. Educated/uneducated and unemployed youth of this region should engage themselves fully in the

preparation of quality food and other related products from karonda fruits as a source of income.

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