



Review Article

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PHOENIX DACTYLIFERA LINN. (PIND KHARJURA): A REVIEW

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ABSTRACT

The medicinal plants are widely used by the traditional medical practitioners for curing various diseases in their day to day practice. *Phoenix dactylifera* Linn. (Pind Kharjura) is the most useful traditional medicinal plant in India. Its fruit is known as Date which is the edible part of the plant. It is now considered as a valuable source of unique natural products for development of medicines and used against various diseases. Its fruit contains high amount of tannins and are used in the different disease condition like raktapitta (hemorrhage), swasa (dyspnoea), kasa (cough), daha (burning sensation), murchha (syncope), abhighata (injury) and kshaya (tuberculosis). The fruits are rich source of carbohydrates, vitamins, and proteins. Its fruit is sweet (madhura), astringent (kasaya) in taste. Now-a-days its fruit is being used in the different Ayurvedic formulation for the treatment of various diseases. It has different pharmacological action like antibacterial, anti-inflammatory, anti-diabetic, anti-asthmatic, nephroprotective, hepatoprotective and aphrodisiac activities. Phytochemical investigation shows that the fruit contains anthocyanins, phenolics, sterols, carotenoids, and flavonoids. Present review highlights phytopharmacological and different traditional uses of *Phoenix dactylifera* Linn. which is mention in ancient Ayurvedic texts. This review stimulates the researchers and scientists for further work on *Phoenix dactylifera*.

Keywords: *Phoenix dactylifera*, Pind Kharjura, phytochemistry, pharmacology, traditional uses.

INTRODUCTION

Phoenix dactylifera Linn. (Pind kharjura)¹ is also known as date palm cultivated for its edible sweet fruit. Date fruits are a good source of low cost food and are an integral part of Arabian diet. For Muslims all over the world dates are of religious importance and are mentioned in many places in the Quran. They are customarily used to break the day long fast during the holy month of Ramadan². It is a medium sized plant, 15-25 m tall, growing singly or forming a clump with several stems from a single root system. The leaves are 4-6 cm long, with spines on the petiole, and pinnate, with about 150 leaflets are 30 cm long and 2 cm wide. The full span of the crown ranges from 6-10 m. Dates contain 20-70 calories each depending on size and species. Fruits are oval, cylindrical 3-7 cm long and 2-7 cm diameter, and when ripe, range from bright red to bright yellow in color, depending on variety. Date contain single stone about 2-2.5 cm long and 6-8 mm thick. Date palm is dioecious, having separate male and female plants. They can be easily grown from seed, but only 50% of seedling will be female and hence fruit bearing, and Dates from seedling plants are often smaller and of poorer quality. Most commercial plantations thus use cuttings of heavily cropping cultivars. Plants grown from cuttings will fruit 2-3 years earlier than seedling plants³.

History

Date palm (*Phoenix dactylifera* Linn.) has long been one of the most important fruit crops in the arid regions of the Arabian Peninsula, North Africa, and the Middle East. During the past three centuries, dates were also introduced to new production areas in Australia, India/Pakistan, Mexico, southern Africa, South America, and the United States. Dates are a main income source and staple food for local populations in many countries in

which they are cultivated, and have played significant roles in the economy, society, and environment of those countries.

Date is one of the oldest known fruit crops and has been cultivated in North Africa and the Middle East for at least 5000 years. The earliest record from Iraq (Mesopotamia) shows that date culture was probably established as early as 3000 BC. Because of the long history of date culture and the wide distribution and exchange of date cultivars, the exact origin of the date is unknown, but it most likely originated from the ancient Mesopotamia area (southern Iraq) or western India. From its center of origin, date cultivation spread throughout the Arabian Peninsula, North Africa, and the Middle East. Date culture had apparently spread into Egypt by the middle of the second millennium BC. The spread of date cultivation later accompanied the expansion of Islam and reached southern Spain and Pakistan. The Spanish were the first to introduce date palms outside the Arabian Peninsula, North Africa, and the Middle East/South Asia, carrying them to America⁴.

Synonyms

- Arabic : Nakhleh
- Bengali : Khejur
- English : Date
- Greek : Phoinix
- Gujrati : Khajur
- Hindi : Khajur, Pinda, Khajur
- Italian : Datter
- Kannada : Kharjura, Pinda Kharajura
- Malayalam : Prantha Puzam
- Marathi : Khajur
- Oriya : Khejuri
- Punjabi : Pinda Khajur

- Sanskrit : Aharjura, Pinda Kharjura
- Spanish : Datiler
- Tamil : Pericham Pazham
- Telugu : Khajur pupandu
- Urdu : Khurma (Khajoor)⁵

Scientific Classification

- Kingdom - Plantae
- Order - Arecales
- Family –Arecaceae
- Genus - *Phoenix*
- Species - *dactylifer*²

Properties and action in different Ayurvedic texts

Rasa: Madhura (sweet), Kashaya (astringent)

Guna: Guru (heavy), Snigdha (viscous)

Virya: Sita (cool)

Vipaka: Madhura (sweet)

Karma: Balya (tonic), Hradya (cardiac tonic), Tarpaka (eye nourishment), Vatahara, Vamak (emetic)⁵.

Charaka Samhita – Madhura (sweet), Guru (heavy), Sita (cool), Brimhana (nourishing), Vrsya (aphrodisiac), Kshaya (tuberculosis), Daha (burning sensation).

Susruta Samhita – Hradya (cardiac tonic), Sita (cool), Tarpana (eye nourishment), Guru (heavy), Kshaya (tuberculosis).

Bhavprakash Nighantu- Deepana (appetizer), Balya (tonic), shukral (spermatogenesis).

Raj Nighantu- Kashay (tuberculosis), Vrsya (aphrodisiac), Brimhana (nourishing), Krimi (antimicrobial).

Dhanvantari Nighantu – Hradya (cardiac tonic), Sita (cool), Guru (heavy).

Kayyadev Nighantu - Sita (cool), Madhura (sweet), Guru (heavy), Snigdha (viscous), Hradya (cardiac tonic), Swasa (dyspnoea), Kasa (cough), Jwara (fever) .

Raj Vallabham – Ripe fruit - best Tridosh shamak⁶.

Part used and their therapeutic uses

Fruit – Sweet, cooling, tonic, fattening, aphrodisiac, alexiteric, useful in leprosy, thirst, asthma, bronchitis, fatigue, tuberculosis, abdominal complaints, fever, vomiting, loss of consciousness and useful in vata disease.

Leave - Aphrodisiac and good for the liver.

Flower- Bitter, purgative, expectorant, tonic to the liver, fever and blood complaints.

Seed - Applied to wounds, lesions, inflammation, demulscient, expectorant, laxative, nutrient and prescribed in the case of asthma, gonorrhoea.

Gum – Useful remedy in diarrhea and disease of the genitor-urinary system⁷.

Indication in different Ayurvedic texts

Cough – Linctuses made of kharjura, pippali (*Piper longum*), draksha (*Vitis vinifera*), sarkara and paddy, each in equal amount , added with honey and ghee is an excellent remedy for cough caused by vata. (Vm.11.7)

Vomiting – Kharjura pulp, coconut, draksha (*Vitis vinifera*), or badar (*Ziziphus jujuba*) should be taken as linctus. (C.S.Ci.20.28)

Heamaturia – Decoction of kharjura, kasmarya (*Cassia sophera*), tinduka (*Diospyros malabarica*) seed and guduchi (*Tinospora cordifolia*) mixed with honey check heamaturia. (VM.35.11)

Consumption – Ghee, kharjura, draksha, sugar, honey and pippali (*Piper longum*) alleviates hoarseness of voice, cough, asthma and fever. (C.S.Ci.8.96)

Grahini Roga – Fermented juice of draksha, sugarcane and kharjura should be used. (C.S.Ci.15.15)

Abnormal Taste – Paste of draksha and kharjura should be kept in mouth and gargles should be used. (S.S.U.39.185)

Hiccough – Pulp of kharjura or pippali (*Piper longum*) mixed with honey. (S.S.U.50.27-28)

Intrinsic heamorrhage – kharjura and honey. (S.S.U.45.20)⁸.

[VM -Vrindamadhav, C.S.Ci- Charaka Samhita Chikitsasthan, S.S.U- Susruta Samhita Uttarsthan]

Composition of date fruits and seeds

Pind Kharjura contains easily digestible sugar (70%), manly glucose, fructose, sucrose, dietary fiber and contain less amount of protein and fats. They also contain vitamins like riboflavin, thiamine, biotin, folic and ascorbic acid that are essential for the body⁹. The pulps are rich in iron, calcium, cobalt, copper, fluorine, magnesium, manganese, potassium, phosphorus, sodium, copper, sulfur, boron, selenium and zinc⁹⁻¹⁰. Consumption of hundred grams of dates can provide over 15% of the recommended daily allowance for selenium, copper, potassium and magnesium¹⁰. In many varieties, potassium can be found at a concentration as high as 0.9% in the flesh while it is as high as 0.5% in some seeds. Other minerals and salts that are found in various proportions include boron, calcium, cobalt, copper, fluorine, iron, magnesium, manganese, potassium, phosphorus, sodium and zinc. Additionally, the seeds also contain aluminum, cadmium, chloride, lead and sulfur in various proportions. Dates contain elemental fluorine that is useful in protecting teeth against decay⁹⁻¹¹.

Phytoconstituents

Pind kharjura fruit pulp contains phytochemicals like phenolics, sterols, carotenoids, anthocyanins, procyanidins, and flavonoids. The ratio and concentrations of these constituents depend on the type of the fruit, stage of fruit picking, location and soil conditions. These phytochemicals also contribute to the nutritional and organoleptic properties of the fruits¹²⁻¹⁷. In the following section each of these are addressed.

Phenolic Acids

Phenolic acids constitute one of the main classes of secondary metabolites and in recent years have been a subject of intense study. It contains a hydroxylated benzene ring with one or more carboxyl groups attached directly or indirectly to it. Mansouri et al., 2005 analyzed the phenolic profile of seven Algerian varieties of date and observed that they contain p-coumaric, ferulic and

sinapic acids, some cinnamic acid derivatives and three different isomers of 5-*o*-caffeoyl shikimic acid¹⁸.

Sterols

Sterols, or steroid alcohols are a subgroup of steroids with a hydroxyl group at the 3-position of the A-ring and are amphipathic lipids. Sterols of plants are called phytosterols and possess a lot of health benefits¹⁹. Kikuchi and Miki (1975) analyzed the sterols of date fruit and observed that they contain cholesterol, campesterol, stigmasterol, β -sitosterol and isofucosterol²⁰.

Carotenoids

Carotenoids are a class of natural fat-soluble pigments, and impart bright coloration to the plants. They are an important source of vitamin A and protect the cell from the deleterious effects of free radicals by acting as antioxidants²¹. Studies have also shown that dates contain the carotenoids, lutein, β -carotene and neoxanthin²².

Procyanidins

Procyanidins are condensed tannins and the main precursors of blue-violet and red pigments in fruits, vegetables, nuts, seeds, flowers, and barks²³. Chemical analysis suggests that the procyanidin existed as higher molecular weight polymers, undecamers through heptadecamers, and decamers²⁴.

Flavonoids

Flavonoids present in plants possess diverse health benefits, which includes antioxidant and radical scavenging activities, reduction of certain chronic diseases, prevention of some cardiovascular disorders and certain kinds of cancerous processes²⁵. It was also observed that both methylated and sulfated forms of luteolin and quercetin are present as mono-, di-, and triglycosylated conjugates while apigenin is present only as the diglycoside. Quercetin and luteolin formed primarily O-glycosidic linkages whereas apigenin was present as the C-glycoside. As of today, dates also have the unique distinction of being the only food to contain flavonoid sulfates²⁵.

Anthocyanins

Anthocyanins are water-soluble vacuolar pigments and may appear in red, purple, or blue. They are widely distributed in many fruits, vegetables, cereal grains and flowers and are of potential health benefits²⁶. Anthocyanins were detected only in fresh dates, indicating that they may be destroyed upon sun-drying²⁷.

Pharmacological Activity

Antifungal Activity

Antifungal activity of water, acetone, methanol extracts of leaves and pits of *Phoenix dactylifera* Linn. were evaluated against several pathogenic fungi. For evaluating this antifungal activity agar well diffusion and agar dilution method were employed. Except water extracts acetone and methanol extracts showed varying degree of growth inhibitors against *Fusarium oxysporum*, *Fusarium speciose* and *Fusarium solani*²⁸.

Antioxidant Properties

Saleh Mobarak Al-Turki analyzed antioxidant properties of date palm cultivars from the United States and Saudi Arabia for their total phenolic content and antioxidant activity for two years. The amount of phenolic compound and antioxidant activity in all date fruit and pit cultivars tested in this study. Results showed that total polyphenolic content of fruit ranged from 507.03 to 225.02 mg gallic acid equivalent and antioxidant activity ranged from 1400.00 to 228.06²⁹.

Hepatoprotective Action

Aly Abdullah Al-Qarawi evaluated CCl₄ induced hepatotoxicity in Rats. They evaluated the ameliorative activity of aqueous extracts of flesh and pits of Dates. Sixty male wistar rat were divided in to six equal groups of 10. Four groups received extract of flesh or pits of *Phoenix dactylifera* and intraperitoneal either before or after administration of flesh or pits³⁰.

Nephroprotective Action

A.A.Al-Qarawi studied the effect of an extract of the flesh and pits of dates (*Phoenix dactylifera* Linn.) on gentamycin nephrotoxicity in rats. The animals were given either date flesh extract mixed with food (50 w/w) or the pits extract mixed in drinking water (2 :1w/w) and gentamycin (80 mg/kg day intramuscularly 6 days) was injected during the last 6 days of treatment. The other groups of rats were given gentamycin concomitantly with the date flesh extract or the date pit extract at the above doses. Gentamycin treatment significantly reduce the increase in plasma creatinine and urea concentration induced by gentamycin nephrotoxicity and ameliorating the proximal tubular damage³¹.

Gastrointestinal protective Activity

Al Qarawi (2005) described that dates are reputed to be useful against peptic ulcers, and the fact that Muslims customarily consume more of dates during the fasting month of Ramadan, could be possibly to protect the gastric mucosa from the damaging effects of the gastric acid³². Feeding rats with aqueous and ethanolic extracts of dates and date pits have been observed to cause a concentration-dependent increase in gastrointestinal transit time. These observations lend believe to the ethnomedicinal claim that dates may be useful to humans with gastric ulcers and also as a natural laxative³³.

Anticancerous Activity

Anticancerous activity shown that the glucans prepared from the dates fruit posses antineoplastic effects in experimental system of study. The author observed a dose dependent anticancer activity with an optimum activity at a dose of 1 mg/kg in mice bearing Sarcoma-180 solid tumors. The authors hypothesize that the observed antitumor activity could be correlated to their (1 → 3)- β -d-glucan linkages³⁴.

Anti inflammatory Activity

Oral administration of the methanolic and aqueous extracts of edible portion of *Phoenix dactylifera* fruits suppressed the swelling in the foot significantly by 67.8

and 61.3% respectively, while the methanolic extracts of date seeds showed significant reduction by 35.5% in adjuvant arthritis in rats by mechanistically reducing ESR and plasma fibrinogen and normalizing the plasma level of antioxidants. Administration of the extracts also produced significant increase in body weight gain and food efficiency ratio³⁵.

Antihyperlipidemic Activity

Coronary heart disease is related to decrease in the concentrations of high density lipoprotein cholesterol and increase in the low density lipoprotein cholesterol. Salah and Al maiman, have reported that feeding the defatted date seed flour containing diet at 1.5%, 2.5% and 5.2% to rats reduced the plasma triglycerides, total cholesterol and low density lipoprotein³⁶.

Immunostimulatory Activity

Immune activation is an effective as well as protective approach against infectious diseases. Immunostimulants enhance the overall immunity of the host, and present a non-specific immune response against the microbial pathogens. They also work to heighten humoral and cellular mediated immune responses, by either enhancing cytokine secretion, or by directly stimulating B- or T-Lymphocytes. Ingestion of phytochemicals to support the immune system or to combat infections has been a long standing traditional practice. Feeding of ethanol extract of dry dates to parturated mice enhanced both cell mediated and humoral immunity³⁷.

Gonadotropic Activity

El- Mougy et al. investigated that date extracts have been shown to increase sperm count in guinea pigs and to enhance spermatogenesis and increase the concentration of testosterone, follicle stimulating hormone, and luteinizing hormone in rats³⁸. Incorporation of date pits in the animal feed is also observed to enhance growth and this was ascribed to an increase in the plasma level of estrogens³⁹ testosterone⁴⁰.

Effect on Hemolytic Activity of *Streptococcus pyogenes*

In vitro studies have shown that date extract effectively slowed the growth of *S. pyogenes*. Incubation of the bacteria for 24 h with date fruit extract at 5, 10 and 20% dilution caused a 30.8%, 64.7% and 88.5% decrease in the microbial number when compared with the concurrent (date extract free medium) cohorts. Further at low concentrations the date extract neutralized the hemolytic activity of the streptococcal exotoxin, streptolysin O, probably due to erythrocyte membrane stabilization and inhibition of streptolysin O enzyme. Fractionated studies showed that the inhibitory substance was steroidal in nature and not proteinaceous as deproteinization of the extract did not decrease its inhibitory effect⁴¹.

Anti- diarrhoeal Activity

Phoenix dactylifera Linn. spathe aqueous extract at doses of 3, 6 and 12 mg/kg produced a statistically significant reduction in both castor oil induced intestinal transit and frequency of diarrhoea in rat. These properties may

explain the rationale for the effective use of the plant as an antidiarrhoeal agent in traditional medicine³⁵.

CONCLUSION

This review article comprised of pharmacological, phytochemicals, and different traditional uses of Pind Kharjura (*Phoenix dactylifera* Linn.) as per the ancient Ayurvedic Text. Pind Kharjura is relatively cheap, nutritious, and is devoid of toxic effect. It is safe to suggest that their consumption should be recommended on a daily basis for better health and vigor. This plant has a great medicinal value as it has been reported to have versatile phytochemical including phenolics, sterols, carotenoids, anthocyanins, procyanidins, flavonoids, different minerals and vitamins. These phytochemicals have been responsible for the different pharmacological effect like antibacterial, anti inflammatory, antidiabetic, antiasthmatic, nephroprotective, hepatoprotective and aphrodisiac etc. Thus this review may be helpful for further investigation in future because in this review we mentioned pharmacology, phytochemistry and specially the different indication, properties and action of the Pind Kharjura which strengthen the claim of our ancient Ayurvedic text like Samhita and Nighantu.

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