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Nutritional values and pharmacological importance of date fruit (*Phoenix dactylifera* Linn): A review

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Abstract

Review is an important in cherishing knowledge and exerting intelligent efforts in the rational practices in natural medicine. Date is delicious fruit enjoyed by all since antiquity. It is valuable food and medicine stated by systems of medicine like Ayurveda, Siddha, Unani medicines and secured valuable status in many formulations. In Ayurved, it is presented that date should be consumed daily. Date is a potent nutritive, aphrodisiac, tonic, laxative fruit. It is effective remedy in various diseases like fever, cancer, pittaja disorders, etc. Dates have been used for both dietary purposes as well as for their phytomedicinal impacts against the variety of diseases. Date fruits are rich in alkaloids, protein, carbohydrate, fatty acid (linoleic, lauric, palmitic, and stearic acid), carotenoids, vitamins, polyphenolic compounds, flavonoids, and tannins along with different types of nutrients like potassium, calcium, magnesium, and phosphorus. Date's assuring preventive potential is hidden in high nutritional values as well as it's antioxidant, anti-inflammatory, antibacterial, anticancer actions. This detailed information on nutritional and health promoting components of dates and their seeds will enhance our knowledge and appreciation for the use of dates in our daily diet and their seeds as a functional food ingredient.

Keywords: date, ayurveda, unani, antioxidant, nutrients

1. Introduction

The nutritional significance and health benefits of dates have also been mentioned in the Muslim's Holy Book "Al-Qur'an (The Koran)¹." Date palm and date fruit have been mentioned in 20 verses of 17 Surahs (Chapters) in The Holy Qur'an. Date has been honored as one of the blessings of paradise (Qur'an, 55:68). Allah (SWT) in Qur'an recommends Maryam (mother of Prophet Jesus) to eat this fruit. Prophet Muhammad (peace be upon him) has urged Muslims to eat dates, maintain date orchards, and has mentioned that dates can cure many diseases/disorders. According to a "Hadith", the sayings of Holy Prophet Muhammad (peace be upon him), "he who eats seven Ajwa dates every morning will not be affected by poison or magic on the day he eats them" (Al-Bukhari, 2008) ^[1].

Date is a delicious fruit with a sweet taste and a fleshy mouth feel. The major component of dates are carbohydrates (mainly the sugars; sucrose, glucose, and fructose), which may constitute about 70%. The sugars in dates are easily digested and can immediately be moved to the blood after consumption and can quickly be metabolized to release energy for various cell activities. Dates are also a good source of fiber, and contain many important vitamins and minerals, including significant amounts of calcium, iron, fluorine, and selenium ^[2, 3, 4, 5, 6, 7]. Dates have also been shown to contain antioxidant and anti-mutagenic properties. Recent studies have shown that dates and their aqueous extracts have demonstrated the free radical scavenging activity, inhibition of free radical-mediated macromolecular damages, antimutagenic, and immunomodulatory activities ^[8, 9, 10, 11]. Further research is required to explore the health benefits of date fruit and date pits as well as the use of their functional components in the development of various value-added food products and supplements. The market for dates and their products could therefore be increased significantly in the future.

2. Materials and Methods

All the available information on *Phoenix dactylifera* was compiled from electronic databases such as Academic Journals, Ethnobotany, Google Scholar, PubMed, Science Direct, Web of Science and library search.

3. Morphology

3.1 Description

Tall tree upto 36 m in height, occasionally found cultivated or self-grown in India.

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Trunks covered with persistent bases of petioles, the base usually surrounded by a mass of offshoots or sudden; leaves in poen crown, pinnate 20-40 cm long, linear, keeled lower pinnae modified into spines; flowers in branched spadices, small; fruit an oblong berry 2.5-7.5 cm long, reddish or yellowish brown when ripe; seed cylindric, hard with a longitudinal furrow ^[12].

3.2 Taxonomical Classification ^[13]

Kingdom	-	Plantae
Subkingdom	-	Tracheobionta
Superdivision	-	Spermatophyta
Division	-	Magnoliophyta
Class	-	Liliopsida
Subclass	-	Arecidae
Order	-	Arecales
Family	-	Areaceae
Genus	-	Phoenix
Species	-	<i>P. dactylifera</i>

3.3 Vernacular names

Arabic-Nakhleh, Bengali-Khejur, Dutch-Datum, English-Date, French-Dattier, German-Daten, Greek-Phoenix, Gujarati-Khajur, Hebrew-Tamar, Hindi-Khajur, Italian-Date, Kannada-Kharjura, pindakharjura, Malayalam-Pranthapuzam, Marathi-khajur, Oriya-khejuri, Portuguese-Dates, Punjabi-Pindakhajur, Russian-Finik, Sanskrit-Khajur, Pind khajur, Spanish-Detailer, Tamil-Perichampazham, Telugu-Khajurpupandu, Urdu-Khurma (Khajoor), etc.

3.4 Distribution

In the legend, the date was the tree of knowledge of good and evil. The exact origin of date plant is not known. But it is cultivated before 4000 B.C. It was used for construction of Moon God temple near southern Iraq-Mesopotamia

(Popenone, 1913, 1973). Its antiquity is also found in Egypt's Nile Valley where it was used as symbol of year in Egyptian hieroglyphics and its frond as symbol of month. (Dowson, 1982). Since long time it is cultivated in North Africa, Arabian Peninsula and Middle East. It is now cultivated in Iran, Iraq, USA, Pakistan, Saudi Arabia, Egypt, UAE, Sudan, South Sudan, Algeria, Tunisia, India, Spain, Mauritania, Morocco, Mali, Oman, Tanzania, Australia, Libya, etc. countries.

3.5 Used part: Fruits



Fig 1: Ripped date fruits

3.6 Varieties ^[14, 15]

There are more than 1500 varieties of dates in the world. Some popular varieties are ajwa, abel, al-khunaizi, barakawi, bireir, dabbas, empress, khalas, khodri, ruthana, sukkary, sefri, segae, munifi, hilali, barhi, dayri, degletnoor, khadrawy, medjool, thoory, zahidi, assel, dhakki, hallavi, dora, ruchdi, ftimi, kentichi, etc. As per one opinion, assel, dhakki, hallavi, dora are safe to eat.

4. Nutritional value

As per USDA, nutritional values of date fruit (*Phoenix dactylifera* Linn-medjool variety) per 100 gm are as follows ^[16].

Nutritional value

Principle	Nutrient value	Percentage of RDA
Energy	277 Kcal	14%
Carbohydrate	74.97 g	58%
Proteins	1.81 g	3%
Total fat	0.15 g	< 1%
Cholesterol	0 mg	0%
Dietary fiber	6.7 gm	18%
Vitamins		
Folate	15 µg	4%
Niacin	1.610 mg	10%
Pantothenic acid	0.805 mg	16%
Pyridoxine	0.249 mg	19%
Riboflavin	0.060 mg	4.5%
Thiamin	0.050 mg	4%
Vit A	149 IU	5%
Vit C	0 mg	0%
Vit K	2.7µg	2%
Electrolytes		
Sodium	1 mg	0%
Potassium	696 mg	16%
Minerals		
Calcium	64 mg	6.5%
Copper	0.362 mg	40%
Iron	0.90 mg	11%
Magnesium	54 mg	13%
Manganese	0.296 mg	13%
Phosphorus	62 mg	9%
Zinc	0.44 mg	4%

Phytonutrients		
Carotene-β	89 μg	--
Crypto-xanthin-β	0 μg	--
Lutein zeaxanthin	23 μg	--

Pharmacological Activities

Activity	Pharmacology/bioactivity
<i>In vitro studies</i>	
Antioxidant activity	Scavenges free radical, inhibit iron-induced lipid peroxidation and protein oxidation ^[10, 17 18] .
Antimutagenic activity	Inhibits benzo (a) pyrene-induced mutagenicity in the Ames test ^[19] .
Antihemolytic activity	Inhibits haemolytic activity of streptolysin ^[19] .
Antiviral activity	Prevent lytic activity of Pseudomonas phage ATCC 14209-B1 on <i>Pseudomonas aeruginosa</i> ^[20] .
Antifungal activity	Antifungal activity against <i>Candida albicans</i> and <i>C. krusei</i> ^[21] .
<i>Animal studies</i>	
Anti-inflammatory activity	Increases plasma antioxidant (Vitamin C, E, A, b- carotene) levels and decreases lipid peroxides. Reduce swelling, ESR and plasma fibrinogen ^[22] .
Action on gastrointestinal tract	Increase gastrointestinal transit time, reduces ethanol- induced gastric ulceration ^[10] .
Antihyperlipidemic activity	Reduces plasma triglycerides, total and LDL cholesterol ^[23] .
Hepatoprotective activity	Prevents dimethoate-induced hepatotoxicity, causes decrease in hepatic markers (ALT, AST, alkaline phosphatase, GGT and LDH), decrease vacuolization, necrosis, congestion, inflammation and enlargement of sinusoids. Has protective effect against CCl ₄ induced hepatotoxicity ^[24] .
Nephroprotective activity	Prevents gentamicin-induced renal damage and reduce levels of creatinine and urea ^[24] .
Anticancer activity	Regression of Sarcoma-180 tumour in mice ^[25] .
Immunostimulant activity	Enhances both cell mediated and humoral immunity ^[26] .
Gonadotropic activity	Increases FSH, LH, testosterone, oestrogen, increases spermatogenesis, sperm count and growth ^[27] .
Hypoglycemic effect	Liver functions were evaluated by ALT, AST and c-GT activities; however the levels of BUN and serum creatinine were estimated to assess the functional capacity of the kidney. Mean values of all tested serum levels were significantly higher in Group 3 compared to Groups 1, 2 and 4 (with the exception of ALT in the case of Seed extract treated group) ^[28] .

5. Traditional uses

In Unani and Ayurved, date fruit is designated as nutritious, aphrodisiac, tonic mainly consumed in debilitating conditions like Rajayakshma and Pittaja disorders like Raktapitta, Visarpa, etc. It is the remedy for alcohol induced damage and detoxifies its ill effects. Many formulations are mentioned to cure a broad spectrum of diseases. In Siddha medicine (G. D. Naidu, Siddha research pharmacopoeia), formulations like Dengue Influenza Cure Powder is popular medicine for Dengue fever. Date is one of the ingredient acts due to its immunomodulatory and antioxidant action ^[13].

6. Effects of overuse ^[13]

Dates contain phytates, tannins, calcium oxalate. These nutrients of date cause serious health effects/complications. Consumption of tannins dates in excess causes kidney bowel stomach irritation, GIT pain, liver damage, mineral and iron deficiency. Phytates consumption causes mineral deficiency. Calcium oxalate being insoluble can cause kidney stone.

7. Conclusion

Dates are one of nature's sweetest treats. Depending on the variety, fresh dates are fairly small in size and range in color from bright red to bright yellow. Medjool and Deglet Noor dates are the most commonly consumed varieties. This review show that dates may be considered as a nutritious food and can play a major role in human nutrition and health because of their wide range of nutritional functional components as well as serving as an important healthy food in the human diet. Also, date seeds are rich sources of dietary fiber and natural anti oxidative compounds that could potentially be used as a supplement of fiber and antioxidants in nutraceutical, pharmaceutical, and medicine industries. Based on the International Food Information

Council Foundation's definition of functional food (IFICF, 1998), dates and their seeds may be regarded as good examples. They are rich in antioxidant nutrients including selenium, phenolics, and carotenoids. They are also high in insoluble fiber which is important for gastrointestinal health. In comparison with other fruits and vegetables, regarded as functional foods, e.g. grapes and car-rots (ADA, 1999), dates are equally as valuable, due to their fiber and antioxidants constituents. For this reason date consumption and utilization of its seed should be recommended. Date's assuring preventive potential is hidden in high nutritional values as well as it's antioxidant, anti-inflammatory, antibacterial, anticancer actions.

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