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REVIEW ARTICLE

Phytopharmacological Review on Date Palm (*Phoenix dactylifera* Linn)

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ABSTRACT

Phoenix dactylifera Linn is known as date palm belonging to the *Arecaceae* family. This plant has various important medicinal uses such as reducing the swelling of foot, stress reducer, air purifier, treating allergies, preventing microbial infections, and improving brain function. Phytochemical analysis documented that the main bioactive compounds responsible for its medicinal effects are namely alkaloids, tannins, anthraquinone glycosides, steroids, flavonoids, flavanols, polyphenols, terpenoids, and saponins. Experiment from recent studies showed that various types of extracts from all parts of *P. dactylifera* exhibited a wide range of beneficial effects such as neuroprotective, hepatoprotective, nephroprotective, anti-bacterial, sedative, anti-ulcer, anti-diabetic, anti-cancer, anti-inflammatory, and anti-hyperlipidemic. Therefore, further research must be conducted to isolate the phytochemicals and explore their specific mechanism of action. This review summarizes the morphology, phytochemistry, pharmacology, and medicinal uses of this plant with the purpose of finding gaps demanding for future research and investigating its therapeutic potential through clinical trials.

Keywords: Medicinal uses, *Phoenix dactylifera*, Phytochemicals, Therapeutic potential

INTRODUCTION

Nowadays, many herbs and flowers and their species bump off as a food in our day-by-day life due to the fact of its effectiveness and preventive nature toward our health.[1] The demand for convenient and immediately nutrient-dense meal replacement has been developing for the past 2 years with growing worries about fitness.[2] *Phoenix dactylifera* Linn. (*P. dactylifera*) is a member of the *Arecaceae* or *Palmaceae* family and is more generally known as the date palm. It has close to 14 species, 200 genera, and more than 2500 species overall.[1] The taxonomic classification of the drug is as follows: Kingdom: *Plantae*; Subkingdom: Tracheobionta; Superdivision: *Spermatophyta*; Division: Magnoliophyta; Clade: *Monocots*; Class: *Liliopsida*; Subclass: Arecidae; Order: Arecales; Family: *Arecaceae*; Genus: Phoenix L.; Species: *Dactylifera* L.[3] It has been grown for more over 4000 years, primarily in arid and dry places.[2] While the native range of this palm is uncertain, it is thought to be indigenous to both North Africa and the Middle East. It is also existing in Turkey, Pakistan, and Northwest India but is idea to have been brought to these areas lengthy ago through transport. Another provide refers this botanical name to the legendary Egyptian bird, "Phoenix," which lived to be five hundred years old, and forged itself into a furnace from which it rose with renewed increase.[4] This resemblance to the date palm, which can moreover re-grow after fireplace damage, makes the hen and the date palm share this name, while "*Dactylifera*" originates from the Hebrew phrase "dachel" which describes the fruit's structure. The pick out of species *Dactylifera*

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viable "finger bearing" which refers to the fruit clusters produced with the aid of capability of using this plant. It mostly has been cultivated principally for cultural, nutritional, environmental, religious, and very social development functions, which definitely is fairly significant. *Dactylifera* essentially is a grouping of Greek phrase dactylus, potential "finger," and Latin phrase ferrous ability bearing, which specifically is fairly significant.[5] Further research is required to explore the health advantages of date fruit and date pits as well as the use of their practical components in the improvement of more than a few value-added food products and supplements. The market for dates and their products could to therefore be expanded appreciably in the future.[6]

The predominant nutritional vitamins of the plant genuinely are derived from fruits, which usually is pretty significant.[7] Due to its prosperous nutritional composition, the date palm fruit can be a great choice for manufacturing snack bars.[2] The drug additionally contains important nutraceuticals, and the fruits are a wealthy and inexpensive source of macro- and micronutrients.[8] Fruit is a cheaper source of nutrients which includes energy; carbohydrates such as reducing sugar, sucrose, fructose, glucose; proteins,[9] amino acid (high concentrations of aspartic acid, proline, alanine, glycine, valine and leucine, low concentrations of threonine, serine, isoleucine, tyrosine, arginine, phenylalanine and lysine and very low concentrations of methionine and histidine,[10] dietary minerals such as potassium, calcium, magnesium, sodium, phosphorus, iron, manganese, zinc[7] dietary fibers such as cellulose, hemicellulose, halocellulose, non-cellulosic polysaccharides, lignin, wax, pectin[11]; vitamins such as beta-carotene, Vitamin-A, Vitamin-B1, Vitamin-B2, Vitamin-B3, Vitamin-B5, Vitamin-B6, Vitamin-B9, Vitamin-C, Vitamin-E, Vitamin-K[7]; ash; they have phytoconstituents stated in the fruits normally are alkaloids, tannins, anthraquinone glycosides, steroids, flavonoids, flavanols, polyphenols, terpenoids, saponins;[12] fatty acids and triacylglycerol analyses showed that oleic acid, lauric acid, and myristic acid were major fatty acids. Then, other fatty acids such as palmitic acid, linoleic acid, stearic acid, behenic acid, lignoceric acid, linolenic acid, arachidic acid, capric acid, caprylic acid, margaric acid, palmitoleic acid, heptadecenoic acid, and eicosenoic acid were found in small amounts; saturated fatty acids, unsaturated fatty acids, monounsaturated fatty acids, and polyunsaturated fatty acids are also present; while 1-myristoyl-2-oleoyl-3-linoleoyl glycerol, 1-linolenoyl-2-oleoyl-3-linoleoyl glycerol, 1-2-linolenoyl-3-linoleoyl glycerol, and 1-linolenoyl-2-myristoyl-3-linoleoyl glycerol were the major triacylglycerols, biophenols, and tocopherols analyses revealed the presence of important compounds such as catechin, vanillin, and α-tocopherol at high remarkable levels. β-tocopherol, γ-tocopherol, δ-tocopherol, vanillic acid, luteolin, tyrosol, oleuropein, caffeine acid, ferulic acid, hydroxytyrosol, luteolin-7-O-glucoside, and luteolin-4-O-glucoside were determined at very low concentrations; many kinds of essential oils are present. It also consists of moisture content.[13]

The plant mainly fruit has strong neuroprotective, hepatoprotective, nephroprotective, anti-bacterial, sedative, anti-ulcer, anti-diabetic, anti-cancer, anti-inflammatory, anti-hyperlipidemic, anti-cryptosporidiosis, anti-tumor, anti-oxidant, hemopoietic, anti-hypertensive, anti-mutagenic, immunostimulator, anti-atherogenic, anti-coagulant, anti-viral, anti-fungal, analgesic, anti-depressant, anti-diarrheal, anti-hemolytic, anti-allergic, anti-leishmanial, treat female reproductive system and fertility problems, reduce delivery and labor pain, treat infertility in males and other activities. Their excessive nutritional value and their therapeutic effects have increased their use, inspiring through the growing consumer difficulty for health.[1] This review intends to summarize more than a few studies on this plant and evaluate the troubles related to standard uses, phytochemistry, and pharmacology of *P. dactylifera*.

VERNACULAR NAMES

Kannada - Kharjura, Pindakharjura; Arabic-Nakhleh; Bengali-Khejur; English-Date; French-Dattier; German-Daten; Greek-Phoenix;

Gujrati-Khajur; Hindi-Khajur; Italian-Date; Malayalam-Pranthapuzam; Marathi-Khajur; Portuguese-Dates; Punjabi-Pindakharjura; Russian-Finik; Sanskrit-Kharjur, Pindakharjur; Spanish-Datiler; Tamil-Perichampazham; Telugu-Khajurpupandu; Urdu-Khurma (Khajoor); Japanese-Natsumeyashi; Odisha-Khejuri.[14]

SPECIES OF THE GENUS PHOENIX ALONG WITH THEIR COMMON LOCAL NAMES[15]

Phoenix acaulis - Stemless date palm
Phoenix andamanensis - Andaman island date palm
Phoenix atlantic - Cape Verde island
Phoenix sylvestris - Indian date palm
P. dactylifera L. - Date palm
Phoenix paludosa - Mangrove date palm
Phoenix canariensis - Canary island date palm
Phoenix reclinata - Senegal date palm
Phoenix pusilla - Ceylon date palm.

VARIETIES

There are more than thousands of varieties of dates in India. Some popular varieties are Amari, Barhi, beglet Nour, Fard, Hadrawi, Hallawy, Huyani, Kabkab, Khadrawi, Khalas, Khasab, Lulu, Mazafati, Medjool, Piarom, Rabbi, and Zahidi.[16]

BOTANICAL DESCRIPTION

Date trees reach up to height, growing singly or forming a clump with countless stems from a single root system. Slow-growing, they can attain over one hundred years of age when maintained properly.

Vegetative organs

Root system

Being a monocotyledon, date palm has no tap root. Its root system is fasciculated and roots are fibrous, similar to a maize plant. Secondary roots exhibit up on the foremost root which makes stronger immediately from the seed. These secondary roots produce lateral roots (tertiary roots and so on) of the equal type with about the identical diameter in the direction of their length. All date palm roots have pneumatics, which are respiratory organs. Roots are discovered as some distance from the palm and deeper than, however, most of the roots are disbursed in the quarter and lateral sides in a deep loamy soil. It is well worth citing that date roots can withstand moist soil for many months, however, if such conditions spread over longer periods, they end up dangerous to the health of the roots and to fruit production.[17]

Trunk (stem)

Trunk mostly is oftentimes characterized through its generally rough sort of gray trunk and a "feather-duster" crown of gray-green fonds. These palms also actually produce offshoots at the base of the trunk. Typically viewed as a definitely single trunk tree but can mostly have kind of more than one actually stems. Diamond pattern on the trunk literally is normally present from leaf scars in a major way.[18]

Leaves

Depending on variety, age of a palm and environmental conditions, leaves of date palms have a normal life of 3–7 years. It consists of the greatest width of the frond midrib, but somewhere, it is only 1/2 this dimension and swiftly narrows from the base upward. The frond midrib or petiole is particularly triangular in go section with two lateral angles and one dorsal. It is naked of spines for a brief distance but full of spines on both sides thereafter. Intermediate zones have spine-like leaflets, additionally known as leaflet-like spins. Leaf shape is variety and environment dependent, however, typically the entire length of a frond has the following proportions:
The distance from the fiber at the base of the frond to the base of the spine-leaflets of the entire frond, the spine-leaflets were occupied; the leaflets were occupied; and the terminal leaflets were occupied.[17]

Fiber, spine, and leaflets

The date palm tree (*P. dactylifera* L.) is regarded as one of the sources of natural fibers. Fibers could

Table 1: Phytochemical constituents present in different parts of plant *Phoenix dactylifera*

Plant parts	Phytochemical constituents
Seeds	Alkaloids, Saponins, Glycosides, Phenols-Flavonoids, Diterpenes, Proteins, Amino acids
Leaves	Flavonoids, Saponins, Steroids, Alkaloids, Phenols, Phytosterols, Tannins, Amino acids, Terpenoids, Carbohydrates
Fruits	Phenolic acids, Flavonoids, Tannins, Carotenoids, Sterols, Phytosterols, Phytoestrogens (Isoflavones, Lignans)
Fibers	Cellulose, Hemicellulose, Halocellulose, Lignin, Pectin, Wax
Pollens	Gallic acid, Catechin, Rutin, Tannic acid
Flowers	Carbohydrates, Steroids, Alkaloids, Flavonoids, Tannins, Vitamins, Phenolics (Cinnamic acids, Falconoid glycosides, Flavones)
Roots	Flavonoids, Steroids, Phenols, Saponins
Trunk	Alkaloids, Saponins, Glycosides, Phenols (Flavonoids), Proteins, Amino acids, Diterpenes

be extracted from one-of-a-kind components of the date palm, namely, the midribs, spadix stems, leaflets, and mesh.[19]

The plant Phoenix dactylifera Linn. consists of different types of phytochemical constituents(Marker Elements) in its different parts. Seeds contains marker elements such as Alkaloids, Saponins, Glycosides, Phenols-Flavonoids, Diterpenes, Proteins, Amino acids. Leaves contains Flavonoids, Saponins, Steroids, Alkaloids, Phenols, Phytosterols, Tannins, Amino acids, Terpenoids, Carbohydrates. Fruits consists of constituents such as Phenolic acids, Flavonoids, Tannins, Carotenoids, Sterols, Phytosterols, Phytoestrogens (Isoflavones, Lignans). The Fibre part of plant contains Cellulose, Hemicellulose, Halocellulose, Lignin, Pectin, Wax. The pollen part consists of Gallic acid, Catechin, Rutin, Tannic acid. The Flower consists of Carbohydrates, Steroids, Alkaloids, Flavonoids, Tannins, Vitamins, Phenolics (Cinnamic acids, Falconoid glycosides, Flavones). The Roots consists of Flavonoids, Steroids, Phenols, Saponins. The Trunk(stem) part of plant consists of Alkaloids, Saponins, Glycosides, Phenols (Flavonoids), Proteins, Amino acids, Diterpenes [Table 1].

Date palm spines kind of are sharp leaflets that particularly develop along the proximal parts of the really large leaves, definitely contrary to popular belief. The spines essentially are usually particularly yellow and black.[20]

The blade, which is the biggest of the leaf, holds the pinnae or leaflets. The Central Stalk of the Blade retaining the pinnae or leaflets is the rachis. The pinnae nearest the petiole are modified into Spines.[21]

Reproductive organs

Fruits

Among the studied gentle date palm cultivars, seven fruit shapes can be distinctive as follows:

a. Cylindrical: It is stout at all length
b. Elliptical: The two sides are curved equally from the middle
c. Ovate elongate: It is broadest slightly under the middle
d. Obovate elongate: It is broadest barely above the middle
e. Falcoid elongate: Slightly curved at the middle
f. Ovate: It is broadest below the center
g. Obovate: It is broadest above the center.

Six colors are identified, and they are dark red, shiny red, pale yellow, yellow, yellow-brown, and orange. Three types of fruit apex are exotic in soft date palm cultivars in Egypt, namely obtuse, blunt, and retuse. Retuse recorded only in Bent Eisha. Four sorts of fruit base are unique in tender date palm cultivars in Egypt, namely obtuse, retuse, truncate, and truncate emarginate. Retuse recorded only in Oreebi, truncate emarginated fruit base in Selmi only. Three categories can be determined among the studied cultivars in accordance to flesh texture: (a) fibrous, (b) firm, and (c) soft.[22]

Flowers

Flowering starts when the palm is about 5–7 years historic and happens in spring. The flora are small, cream-colored, and in large branched clusters of both female and male vegetation on separate palms. For fruit to be produced, the plant life on female palms has to be fertilized by pollen from male palms, and this switch only takes place naturally with the help of the wind. Fertilized plant life develops into fleshy oval fruit.[23]

Seeds

Seed size was evaluated using four parameters: Length, width, thickness, and dorsal view surface. The dimension and form of seeds allowed an accurate differentiation of Phoenix species. The cultivated date palm suggests extraordinary measurement and structure features, in contrast to different Phoenix species: Seeds are longer and elongated.[24] Seeds are the by-product of date stoning, both for the production of pitted dates and for the manufacture of paste. The seed is a hard-coated seed, generally oblong, ventrally grooved, with a small embryo. Pits are also present and represent the fruit weight relying on maturity, range, and grade. Seeds are traditionally used for animal feed. They can also be used as a source of oil (which has antioxidant houses precious in cosmetics), as a coffee substitute, as a raw cloth for activated carbon or as an adsorbent for dye-containing water. Their by-products are normally fed to animals for the duration of winter, though they can be used at any time of the year.[25]

Pollens

Pollen grains of all Phoenix cultivars had been comparable to ordinary structure and size. Grains were elliptical and boat formed with one deep germinal furrow extending length wise across the polar surface. There is no considerable supratectal sculpturing; however, some cultivars or clones have an exine that is rougher in texture than others. The exine (outer coat of pollen grain) normally well known shows a tectate-perforate structural sample (showing small perforations in the rectum), with irregularly shaped holes.[26] The germinal furrow was once closed without in pollen of some Phoenix species. Pollen grain's ends had been either sharply tapered or extra easily rounded. Sharply tapered grains had markedly pointed ends. Rounded grains had slightly wider edges of the germinal furrow.[27]

PHARMACOLOGICAL ACTIVITY

Neuroprotective activity[28]

Pujari *et al*. reported that the methanol-water extract of *P. dactylifera* L. fruit at the dose level of 100 mg/kg and 300 mg/kg in male Wister albino rats has neuroprotective activity and it is due to the presence of active phytoconstituents, i.e., phenolic compounds (flavonoids), ascorbic acids.

Hepatoprotective activity[29]

Tiwari *et al*. reported the *P. dactylifera* fruit aqueous extract used to treat ethanol-induced hepatotoxicity in albino rats at the dose level of 10 mg/kg, 20 mg/kg, and 40 mg/kg. Higher dose shows the potent hepatoprotective activity as compared with standard drug silymarin. It is due to the presence of active phytoconstituents such as flavonoids.

Nephroprotective activity[30]

Al-Qarawi *et al*. reported that *P. dactylifera* flesh and pits aqueous extract act on gentamicin-induced nephrotoxicity in Wister albino rats and cured with 100, 200, 400, 800, 1600, and 3200 mg/kg. It has nephroprotective potential due to the presence of important constituent alkaloids, steroids, and carotenoids.

Anti-tumor activity[31]

El Abed *et al*. concluded that aqueous ethanolic extract of *P. dactylifera* at the dose level of 1–100 mg/mL shows *in vitro* anti-tumor activity by inhibition of phospholipase A_2 activity due to the presence of constituents such as flavonoids, polyphenols, and terpenoids.

Anti-ulcer activity[32]

Gangwar *et al*. reported the chloroform extract of leaves of *P. dactylifera* Linn. The dose level of 200 and 400 mg/kg shows anti-ulcer potential against ethanol-induced ulcer on male albino rats due to the presence of saponins, flavonoids, and volatile oils. It is compared with the standard drug ranitidine.

Anti-diabetic activity[33]

Hasan and Mohieldein concluded that *P. dactylifera* L. seed extract at dose level of 10 mL/kg in male

Wister rats. It has anti-diabetic potential against streptozotocin-induced diabetes due to the presence of total phenols and flavonoids.

Anti-cancer activity[34]

Khattak *et al*. reported that acetone-water extract of pits of *P. dactylifera* L. at dose level of 0.5, 1.0, and 2.5 mg/mL has anti-cancer effect due to the presence of phenolic compounds such as flavonoids and rutin, caffeine acid, micronutrients.

Anti-bacterial activity[35]

Al-Daihan and Bhat investigated that *P. dactylifera* aqueous extract of pits active against *Escherichia coli*, K. pneumonia, and acetone extract of fruits active against *Staphylococcus aureus* and methanol extract of leaf against *E. coli* at dose of 100 μL/disc due to the presence of constituent alkaloids, carbohydrates, and flavonoids. That is compared with standard kanamycin.

Anti-viral activity[36]

Jassim and Naji reported that acetone extract of pits of *P. dactylifera* L. at dose level of 10, 100, and 1000 μg/mL and for 15 min, it showed 30, 50, and 100% inhibition, respectively. It has potent anti-viral potential on pseudomonas phage due to the presence of flavonoids, terpenoids, lignins, and alkaloids.

Anti-hyperlipidemic activity[37]

Ahmed *et al*. were concluded that fruit suspension of *P. dactylifera* of dose level 300 and 600 mg/kg active against vanaspati ghee and coconut oil-induced hyperlipidemia in forty adult male albino rats. It is compared with standard drug atorvastatin. It shows anti-hyperlipidemic activity due to the presence of phytochemical constituents such as alkaloids, flavonoids, phenolics.

Anti-atherogenic activity[38]

Saryono *et al*. reported that the methanolic extract of seeds of *P. dactylifera* of dose level 0.25, 0.5, and 1 g/kg shows anti-atherogenic potential against the duck egg yolk-induced atherogenicity in Wister male rats. It is due to the presence of constituents such as anthocyanins. It is then compared with the standard drug simvastatin.

Sedative activity[39]

Rahimi *et al*. concluded that *P. dactylifera* has potent sedative activity. The hydro-alcoholic extract of pollens of the plant was administered in different doses to male Wister rats and compared with the standard drug.

Anti-inflammatory activity[40]

Ismail *et al*. reported that the methanolic extract of seeds of *P. dactylifera* of dose level 100, 200, and 300 mg/kg shown potent anti-inflammatory activity against carrageenan-induced inflammation in Sprague-Dawley rats. It is due to the presence of phytochemical constituents such as saponins, flavonoids, steroids, and tannins.

Anti-oxidant activity[41]

Huang *et al*. were concluded that *P. dactylifera* L. has potent anti-oxidant activity. The Extract of seeds of different doses acts against oxidation and samples were compared with control. It is determined by MTT assay. The action is due to the presence of constituents such as phenolics, melatonin, carotenoids, and vitamins.

Analgesic activity[42]

Yunusa *et al*. reported that methanolic extract of fruits of *P. dactylifera* showed analgesic activity against acetic acid-induced pain. It was acted at the dose level 150, 300, and 600 mg/kg in male Wister rats. It is due to the presence of constituent alkaloids, flavonoids, and glycosides.

Anti-fungal activity[43]

Bokhari and Perveen reported that anti-fungal activity of *P. dactylifera* L. was performed by

agar well-diffusion method and agar dilution method. Methanolic extract of leaves and pits of dose 50 μL/well act against *Fusarium oxysporum* and other fungal organisms due to the presence of flavonoids, quinones, and coumarins.

Anti-depressant activity[44]

Farheen *et al*. concluded the ethanolic extract of fruit mesocarp of *P. dactylifera* Lin. The dose of 200 mg/kg has potent anti-depressant activity against diazepam-induced depression in male albino rats. It is compared with standard drug imipramine. Activity is due to the presence of constituents such as flavonoids (quercetin, luteolin) and condensed tannins.

Hemopoietic activity[45]

Onuh *et al*. reported that aqueous fruit extract of *P. dactylifera* is shown hemopoietic activity at dose levels 0.4, 0.1, 0.52, and 0.90 mg/kg in Wister rats. It is due to the presence of constituents such as kaempferol, sitosterol, and catechin.

Anti-mutagenic activity[46]

Verma and Gautam reported that *P. dactylifera* has anti-mutagenic activity. The aqueous extract of fruits acts against the mitomycin C-induced mutagenesis. The activity is due to the presence of phenolic compounds. It is carried by Tk6 gene mutation assay.

Anti-diarrheal activity[47]

Agbon *et al*. concluded that aqueous fruit extract of *P. dactylifera* at dose levels 1000, 1500, and 2000 mg/kg and act on Wister rats and act against the castor oil-induced mutagenesis and showed anti-diarrheal potential. It is due to the presence of alkaloids, tannins, and flavonoids.

Anti-hemolytic activity[48]

Abuharfeil *et al*. reported that fruits extract of *P. dactylifera* L. has anti-hemolytic property. It acts against streptolysin O-induced hemolysis by hemolytic assay. It is due to the presence of constituent phenolic compounds, phytosterols, and carotenoids.

Anti-cryptosporidiosis activity[49]

Mahmood *et al*. reported that *P. dactylifera* fruits possess the anti-cryptosporidiosis activity. The aqueous extract used to treat dexamethasone sodium phosphate-induced cryptosporidiosis in male mice at dose 20 mg/kg. It is due to phenols, amino acids, and proteins.

Immunostimulant activity[50]

Eddine *et al*. concluded that an extract of *P. dactylifera* has immunostimulant activity. It acts on immunosuppressed adult male Mus Musculus mice at 30, 50, and 100 mg/kg and shows its action.

Coagulant activity[51]

Ainul Mardhiyah *et al*. reported that ethanolic extract of pits of *P. dactylifera* L. has a potent coagulant activity at 0.1, 0.5, and 1.0 g/mL dose by *in vitro* method.

Cardioprotective and nephroprotective activity[52]

Wang *et al*. reported that *P. dactylifera* is shown potent cardioprotective and nephroprotective activity against doxorubicin-induced cardiotoxicity and nephrotoxicity in Wister albino rats. The methanolic fruit extract at the dose of 1 g/kg showed action due to the presence of flavonoids and steroids.

Treatment for delivery and labor relaxation[53]

Karimi AB *et al*. concluded that *P. dactylifera* L. fruits are shown their effects on labor. It increases the labor and dilates the cervical portion during pregnancy in women. It is due to the presence of constituent linoleic acid and amino acid.

Treatment of fertility and development of reproductive activity in females[54]

Moshfegh *et al*. reported that the pollen extract of *P. dactylifera* showed the treatment of fertility and development of reproductive activity in females using female Balb/C mice at dose levels 100 and 200 mg/kg.

Treatment of fertility and development of reproductive activity in males[55]

Bahmanpour *et al*. reported that the pollen extract of *P. dactylifera* showed the treatment of fertility and development of reproductive activity in males using male Sprague-Dawley rats at dose levels 30, 60, 120, and 240 mg/kg.

Anti-Allergic activity[56]

Karasawa and Otani reported that the water extract of fruit of *P. dactylifera* L. is shown a potential anti-allergic activity in allergy-induced mice. They are administered with the dose of 10.78, 0.88, 0.74, 7.55, 3.64, and 3.15 mg/g. It is due to the presence of vanillic acid and ellagic acid.

Anti-Leishmanial activity[57]

Albakhit *et al*. reported that methanolic extract of fruits and pits of *P. dactylifera* L. showed the anti-leishmanial potential against promastigotes. Here, MTT assay was performed to know the actions.

ETHNOMEDICINAL USES[58]

The traditional uses of *P. dactylifera* are in Ayurveda also, its formulation used as tonic for the cure of Visarpa and Raktapitta. The fruit pulp of date is regarded to be antitussive, expectorant, demulcent, laxative, and diuretic. The date palm is also used for the relieving of alcohol-induced detoxification. In Siddha system of medicine, date palm powder is used for the remedy of dengue and influenza.

It is additionally use in some specific case like convalescence from fevers and smallpox. The sweet date pulp is additionally used in dysentery. Date fruits are additionally beneficial for the remedy of asthma and headache. Those patients who are suffering from piles can use smoke of dates seed to get relieve from the pain. Dates fruits are also used as expectorants, cough relievers and to prevent constipation. Daily routine consumption of date fruits is helpful in ameliorating cough, rheumatism, burning sensation, nephropathy, bronchitis, and sexual debility.[59]

EFFECTS OF OVERUSE[60]

Might cause abdominal issues

Dates through themselves might also now not motive abdominal troubles – unless they have sulfites delivered to them – which is most frequent today. Individuals sensitive to sulfites can go through from certain reactions such as belly pain, gas, bloating, and diarrhea.

Can cause skin rashes

Dried fruit like dates can additionally motive pores and skin rashes, and the culprit, as soon as again, are the sulfites. Rashes can additionally be induced through mold present in many dried fruits, dates being one of them.

Can cause extra care

Dates can lead to allergies, and allergic reactions can cause asthma, it is higher if susceptible men and women take greater care.

Can cause weight gain

Although dates are high in fiber, they also are relatively excessive in calories and power density and can make a contribution to exceptional weight gain.

Can lead to Hyperkalemia

Hyperkalemia is the situation where levels of potassium come to be excessively high in the

blood. Dates are a wealthy source of potassium, and ingesting too many of them can lead to this condition.

The wax coating can have harmful effects

Fruits are often coated with wax just to enhance their appearance and supply them a bright attraction – so they continue to be and seem clean for longer durations of time. The shine of dates commonly comes from petroleum wax or chemical spray, both of which can lead to severe digestive problems such as stomach aches, vomiting, diarrhea, and nausea in the long run.

Dates are too thick for babies

They find them difficult to chew, and because their intestines are developing, dates may also no longer get easily digested. This can lead to complications. In fact, dates can additionally block an infant's windpipe and choke them – so please workout caution.

CONCLUSION

Date palm (*P. dactylifera* Linn.) is a remarkable plant that has been utilized for its medicinal properties for centuries. While the phytopharmacological research on date palm is promising, further studies, including clinical trials, are needed to validate and expand upon these findings. Moreover, the use of date palm in traditional medicine should be carefully considered, and it is essential to consult with health-care professionals before using it as a treatment for specific health conditions.

Incorporating date palm into one's diet as a natural source of antioxidants and other beneficial compounds may provide potential health benefits. However, the extent of these benefits and the optimal dosages for therapeutic use require further investigation. Nevertheless, date palm remains an intriguing subject of study in the field of phytopharmacology and its potential contributions to human health are worthy of ongoing exploration.

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