Pharmacological Activity of *Khurma* (*Phoenix dactylifera* Linn.)
A Review

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Date fruits (*Khurma*) have been known to possess many medicinal properties when consumed either alone or in combination with other herbs. Due to nutritional and phytochemical composition, it is considered to be highly nutritious having potential health benefits. In Unani classic this activity is known as *Ghiza-e-Dawae.* Above all date fruits (*Khurma*) is mentioned nineteen times in Qur'an with uses in different context. This review aims to describe the pharmacological studies on this plant in various diseases. Scientific community has validated that it has multiple beneficial effects.

Keywords: *Khurma*, Pharmacological activity, *Phoenix dactylifera* Linn., Unani Medicine, Review etc.

Introduction

Khurma (Khajoor) (*Phoenix dactylifera* Linn.) Family

The date palm was well known since ancient times and Egyptians regarded it as a fertility symbol. Its generic name was given by Theosphrastus and due to this plant belonging to this genus was referred to as Phoenicians. Its specific name is composed of dactylus i.e. date. Dates or *Khurma* are oval, cylindrical 3-7 cm long and 2-7 cm in diameter bright yellow to bright red in colour fruits of a plant *Phoenix dactylifera* Linn. Plants are 15-25 meter tall with several stems from single root

system. The leaves are 2-4 cm long and 2 cm wide with spikes on the petioles and pinnates. Its other names are *Khurma* in Urdu, Khajoor in Hindi, Nakhlah in Arabic and dates in English. *Nakhlah* is a low cost and highly nutritious food of Arabian culture. Dates are cultivated in Middle-East and North Africa since more than 5000 years. It has got religious importance in Islamic culture all over the world. It is mentioned at nineteen places in holy book of Qur'an. Al-Qarawi described that dates are repute to be useful against peptic ulcer and this is evident from the fact that Muslims customarily consume more dates during the holy month of Ramadan, to protect the gastric mucosa from the damaging effect of the gastric acid.

The aim of this review on pharmacological activity of *Khurma* (*Phoenix dactylifera* Linn.) is an attempt to correlate the actions mentioned in Unani classics with the scientific validations done by the scientist for the benefit of mankind.

Properties and Action in Different Unani Texts

According to Unani classics the temperament of *Khurma* is Hot 2nd degree and Dry 1st degree (Ghani, 1926). Its various actions as per Unani literature are: *Muqawwi* (Tonic), (Ali, 2010), *Muwallid-e-Dam* (Heamatogenic); *Muqawwi Kulliya* (nephroprotective) *Musammin-e-Badan* (General Adipogenous), *Mujalli-e-Dandan* (Tooth cleanser), *Mushtahi* (Appetizer), *Musakkin-e-Alam*/*Dafi'-e-Alam* (Analgesic), *Mudammil-e-Qurooh* (cicatrizant), *Qabiz* (Astringent) (Khan, 1303 H; Ghani, 1926; Kabiruddin 1937; Hakeem, 1995). *Muqawwi-e-Dandan* (teeth strengthener), *Musaffi-e-laun* (Complex enhancer) (Ibn Baitar, 1985). *Mughazzi* (Nutritive), *Mulayyan-e-Batn* (laxative), *Muwallid-e-Mani* (spermatogenic), (Masihi, [452 d.] 2008; Majoosi, ynm), *Muqawwi-e-Meda* (Stomachic) (Majoosi YNM). It is stimulant for blood circulation and *Mudir-e-Baul* (diuretics).

Uses

In Unani classics, it is mentioned that *Khurma* with milk is *Muqawwi badan* (general Tonic); *Muqawwi Bah* (Aphrodisiac); *Muqawwi Aasaab* (Nervine tonics) (Ali, 2010). It is also useful in *Laqwa* (facial paralysis) and *Falij* (paralysis) *Waja-al-Zohr* (backache) and *Waja-al-Warik* (Ischialgia), *Huzaal-e-Kulyah.* (Khan, 1303 H; Ghani, 1926; Kabiruddin, 1937; Hakeem, 1995; Ibn Baitar, 1985; Haleem, ynm). Gargle with its leaves decoction along with beetle strengthens the tooth and cleanses tooth and relieve toothache (Ibn Baitar, 1985; Khan, 1303 H; Ghani, 1926). Powder of seed useful in diarrhea, its tooth powder cleanses

tooth. Powder of its seeds is used as *Munaqqi-e-Qurooh* (wound cleaner) and *Mudammil-e-Qurooh* (wound healer) and hemorrhagic condition. Pulp of date palm is antipyretic when used with root of *Chirchitta* (*Lycium barbarum* Linn.) and *Tanbol* (*Piper betle* Linn.). Its root, if used as *Miswak* helps in cleaning tooth and relieving toothache. Local application of date is beneficial at the site in cases of honey bee bites (Majoosi, ynm). It is *Musammin-e-Badan* (general adipogenous) if taken with almond (Hakim, 1311 H) or rice (Khan, 1303 H). Gargle with water and vinegar is beneficial in gingivitis and loose tooth. Local application in form of *zimad* is beneficial in infected wound. Local application of Ash of *Khurma* is beneficial in chronic wounds. Its decoction is lithotriptic if used with Methi (*Trigonella foenum-graecum* Linn.). Date is strong aphrodisiac and haematogenic if used with fresh milk. Antidiarrhoeal in children if used with *Murdarsang* (Massicot/Lead oxide/Plumbi oxidum). Decoction of seed is antiseptic and wound healer if is chronic wound is irrigated, *Sabal* (Vascular keratitis/Pannus), *Qurooh-ul-Ain* (Ulcers of the eye), *Zurqah-al-Ain* (Cyanosis of the eye), growth of eye lashes (Khan, 1303 H).

Contraindication

In Unani classics, it is also mentioned that the dates is not to be used if suffering from *Warm-e-Sulb Jigar wa Tihal* (inflammation of liver and pancreas), *Humma* (fever), *Ramad* (conjunctivitis), *Suda* (headache), *Qula* (stomatitis) *Khunaq* (diptheria). It can also cause nephrolithiasis, *Dunbal* (furuncle/boil) *Jarab* (scabies) if used in excess (Khan, 1303 H).

Chemical Analysis

Khurma has the following chemical constituents which show different activities in human body. It contains easily digestible sugar predominantly, glucose, fructose, sucrose, dietary fiber more than 70% and also contain less amount of protein and fats. *Khurma* also has essential vitamins like riboflavin, thiamine, biotin, folic acid and ascorbic acid. The pulp of *Khurma* is rich in iron, calcium, cobalt, copper, fluorine, magnesium, potassium, phosphorous, sodium, copper, sulphur, boron, selenium, and zinc. Other salts and minerals that are present includes aluminum, cadmium, chloride, lead and sulfur. It also contains fluorine that is useful against tooth decay.

Phyto-constituents

The *Khurma* has the following phyto-constituents which show

different activities in human body. These are phenolics, sterols, carotenoids, anthocyanins, procyanadins and flavonoids. These constituents contribute to the nutritional and organoleptic properties of the fruits. Therapeutic activity depends on these phytoconstituents (Abdelhak *et al.,* 2005; Abdul and Alliath, 2008; Ahmad *et al.,* 1995; Fayadh and Al-Showiman, 1990; Al-Farsi, 2005).

Pharmacological Activities

Multiple pharmacological actions have been associated with *P. dactylifera* as summarized below:

Anti Allergic

Hot water extract of matured fruit of the date palm significantly lower the sneezing and nose rubbing events in mite-sensitized mice via a reduction in the number of IgE-producing plasma cells and high-affinity IgE receptor-expressing mast cells compared to control group (Karasawa and Otani, 2012).

Anti Atherogenic

Consumption of dates by healthy subjects, despite their high sugar content, demonstrated beneficial effects on serum triacylglycerol and oxidative stress without having negative effect on serum glucose and lipid/lipoprotein patterns, and thus can be considered an antiatherogenic nutrient (Rock *et al.,* 2009). Ethanol and acetone extract inhibited LDL oxidation and most extracts also stimulated cholesterol removal from macrophages showing atherogenic activity (Neori *et al.,* 2013).

Effect on Labour and Delivery

In an study at Jordan reported that women consuming six dates per day for 4 weeks prior to their estimated date of delivery had significantly higher mean cervical dilatation upon admission compared with the non-date fruit consumers and a significantly higher proportion of intact membranes. It also reduced the need for induction and augmentation of labour, and produced a favorable delivery outcome (Al-Kuran *et al.,* 2011).

Anti Bacterial

Date extract slowed the growth and neutralized the hemolytic activity of *streptococcus pyogenes* (Abuharfeil *et al.,* 1999).

Antifungal

Extract of date palm *Phoenix dactylifera* L. was antifungal against *Fusarium oxysporum* f. sp. *albedinis* (Foa). (Boulenouar *et al.,* 2011). Leaves and pits extract (water, acetone and methanol) also showed antifungal activity against *Fusarium oxyporum, Fusarium* spp. and *Fusarium solani* (Bokhari and Parveen, 2012).

Antiviral

A crude acetone extract of the pit of date palm (*Phoenix dactylifera* L.) showed antiviral activity against lytic *Pseudomonas, Pseudomonas aeruginosa* (Jassim and Naji, 2009).

Anti Cancer

Date fruit extract exhibited dose-dependent inhibition of benzo(a)pyrene-induced mutagenicity on Salmonella tester strains TA-98 and TA-100 with metabolic activation (Vayalil, 2002). The polysaccharides from the dates fruits posses antineoplastic effects in dose dependent manner in experimental system This research validated the traditional claim of date fruits to be used against various kinds of tumors (Ishurda and Kennedy, 2005). Suspension of date palm pollen significantly protected the effect of atypical prostatic hyperplasia-induced by testosterone injection in Wistar rats (Elberry *et al.,* 2011). Aqueous extract significantly restored the DNA damage induced by N-Nitroso-N-methylurea mutagenic effect in mice (Diab and Aboul, 2012).

Anti Diabetic

Phoenix dactylifera leaf extract and acetone extract of date fruit epicarp significantly reduced the sugar levels in alloxan-induced diabetes in rats (Mard *et al.,* 2010; Micheal *et al.,* 2013).

Anti Diarrheal (*Daf-e-Ishaal*)

Aqueous extract of *Phoenix dactylifera* L. significantly induced intestinal transit and frequency of castrol oil induced diarrhea in rats (Vyawahare *et al.,* 2009). Seeds of dates and flower of date palm are used as *Daf e Ishaal* (anti diarrheal) (Ghani, 1926).

Anti Hyperlipedemic (*Daf-e-Shahmuddam*)

Date seed flour reduced the plasma triglycerides, total cholesterol

and low density lipoprotein in rats (Al-Maiman, 2005). Acetone extract of date fruits epicarp significantly lowered the cholesterol and triglycerides levels in alloxon induced diabetes in rats (Micheal *et al.,* 2013). Leaf extract displayed antihyperlipidemic effects in alloxan-induced diabetic rats (Mard *et al.,* 2010).

Anti-inflammatory (*Muhallil-e-Warm*)

Suspension of date palm pollen has a potential for protective effect in atypical prostatic hyperplasia induced in Wistar rats through modulation of cytokine expression and/or upregulation of their autocrine/paracrine receptors (Elberry *et al.,* 2011). Date fruit aqueous extract reduced the intracellular development by lowering the faecal output of *E. papillata oocysts* in mice, date fruit can protect against *coccidiosis*-induced infection, most likely due to the anti-inflammatory activity of date protecting host tissue from injuries induced by the parasite, and hence it is recommended to be used as an excellent food additive (Metwaly *et al.,* 2012). The ethyl acetate, methanolic, and water extracts also elicited anti-inflammatory activity (Zhang, *et. al.* 2013).

Antioxidant

Fresh and sun-dried dates showed antioxidant activity. It is a good source of natural antioxidants and could potentially be considered as a functional food or functional food ingredient; although some of their antioxidant constituents are lost during sun-drying. (Al-Farsi *et al.,* 2005). *Saleeh Mobarak al-Turki* comparatively analysed United States and Saudi Arab date palm for antioxidant activity with promising results. (Al-Turki, 2008). *Phoenix dactylifera* L. posses' phytosterols, lipids and polyphenols and showed antioxidant activity through DPPH assay (Liolios *et al.,* 2009). The ethyl acetate, methanolic, and water extracts of Ajwa dates inhibited COX-1, COX-2 and LPO enzyme (Zhang *et al.,* 2013). Methanolic extracts of fruit also showed antioxidant activity (Mohamed Lemine *et al.,* 2014). Hydro-acetone extract from seeds demonstrated antioxidant activity in rats in CCL_4 induced hepato-reno-toxicity recovery from xenobiotics-induced toxicity initiated by free radicals (Ahmed *et al.,* 2015). Date seed protein hydrosylates were evaluated for antioxidant activity (Ambigaipalan and Shahidi, 2015).

Anti Sterility

Date palm pollen (DPP) extract restored spermatogenesis and attenuated the toxic effects of cadmium on the reproductive system

to the levels observed in the control animals. These findings support DPP can ameliorate the deleterious effects of Cd, probably by activating testicular endocrine and antioxidant systems (El-Neweshly *et al.,* 2013).

Gastrointestinal Protective Activity (*Muqawwi-e-Meda*)

Aqueous and ethanol extracts of date flesh and date pits showed better response on gastrointestinal transit (Al-Qarawi *et al.,* 2003). Aqueous and ethanolic undialyzed and dialyzed extracts from date fruit antagonized ethanol-induced gastric ulceration in rats and also showed gastro-protective action (Al-Qarawi *et al.,* 2005). Flower of date palm is considered to be *Muqawwi-e-Meda* (Ghani, 1926).

Gonadotropic (*Muqawwi-e-Bah*)

Date extract significantly increased sperm count in guinea pig and enhance spermatogensis and increased the concentration of testosterone, luteinizing hormone, and follicle stimulating hormone in rats (El-Mougy *et al.,* 1991). It also enhanced growth and this was ascribing to an increase in the plasma level of estrogens (Elgasim *et al.,* 1995) testosterone (Ali *et al.,* 1999). Oral administration of pits of date palm ignificantly declined malondaldehyde levels in testicular tissues (Orabia and Shawky, 2014). Dates fruit is *Muqawwi-e-Bah* in Unani classics (Ghani, 1926; Kabiruddin, 1937; Hakeem, 1995).

Hepatoprotective (*Muqawwi-e-Jigar*)

Aqueous extract of flesh and pits of dates were hepatoprotective against carbon tetra chloride induced hepato-toxicity (Al-Qarawi *et al.,* 2004) and against dimethoate induced liver-toxicity in rats (Saafi *et al.,* 2011). Acetone extracts of date fruits epicarp significantly improved the liver function markedly AST and ALT in alloxon induced diabetes in rats (Micheal *et al.,* 2013). Oral administration of pits of date palm caused a significant reduction in ALT (Orabia and Shawky, 2014). Aqueous suspension of *P. dactylifera* seeds reported to be nephroprotective in streptozotocin-induced diabetic complications in rats by reducing the serum biochemical parameters and liver tissues by assessment of thiobarbituric acid reactive substances (TBARS), nitric oxide (NO), reduced glutathione, superoxide dismutase (SOD), glutathione S-transferase, and catalase (Abdelaziz *et al.,* 2015). Hydro-acetone extract from seeds provided hepato-protection against CCL_4 induced hepatotoxicity in rats (Ahmed *et al.,* 2015).

Immunostimulatory

Phoenix dactylifera successfully stimulated cell mediated immunity and haem-agglutinating antibody (HA) titres and plaque-forming cell (PFC) counts as parameters of humoral immunity after child birth (Puri *et al.,* 2000). Hot water extract of matured fruits significantly stimulated the cell immune system in mice (Karasawa *et al.,* 2011) and clinically improved immunological markers in allergic rhinitis cases (Boghdadi *et al.,* 2012).

Haematopoietic (*Muallid-e-Dam*)

Oral administration of pits of date palm caused a significant rise in hemoglobin concentration, MCH and MCHC while caused a significant decline in total protein (Orabia and Shawky, 2014). Date fruit has heamtogenic property and useful in cases of anemia (Ghani, 1926; Kabiruddin, 1937; Hakeem, 1995).

Nephroprotective (*Muqawwi-e-Kulliyah*)

Extract of flesh and pits of dates significantly showed nephroprotective action by reducing the increase in plasma creatinine and urea concentration induced by gentamicin nephrotoxicity and ameliorates the proximal tubular damage (Al-Qarawi *et al.,* 2008). Oral administration of pits of date palm caused a significant decrease in creatinine (Orabia and Shawky, 2014). Aqueous suspension of *P. dactylifera* seeds showed nephroprotective activity in streptozotocin-induced diabetic complications in rats by reducing the serum biochemical parameters and kidney tissues by assessment of thiobarbituric acid reactive substances (TBARS), nitric oxide (NO), reduced glutathione, superoxide dismutase (SOD), glutathione S-transferase, and catalase (Abdelaziz *et al.,* 2015). Hydroacetone extract from seeds showed nephroprotection against CCL_4 induced renal toxicity in rats (Ahmed *et al.,* 2015).

Neuroprotective (*Muqawwi-e-Aasaab*)

Methanolic extract of *P. dactylifera* fruits induced neuro-protective actions against bilateral common carotid artery occlusion induced oxidative stress and neuronal damage in rats (Pujari *et al.,* 2011). Aqueous extract also significantly reversed each nerve diameter reduction in an open field behavioral test and of the conduction velocity of the sciatic nerve in streptozotocin induced diabetic rats (Zangiabadi *et al.,* 2011). Date fruit

has *Muqawwi-e-Aam* (General health tonic) action and hence in cases of weakness it is useful.

Repellent (*Daf-e-Hashraat*)

Essential oil of *Phoenix dactylifera* L showed promising repellent activity against yellow fever mosquito – *Aedes aegypti*. In this aspect, the *P. dactylifera* spathe oil is a sustainable, promising new source of natural repellents (Demirci *et al.,* 2013).

Discussion and Conclusion

Date is a cheap source of food in Arabian countries and has a great importance in Islam. Prophet Mohammad (ﷺ) said *Nakhlah* (*Khurma*) is a complete diet. The scientist validated his claim and reported that date has almost all the nutrients that are required for healthy body. Chemical and physical properties of date fruits from date palm showed it has all essential macro-elements and micro-elements e.g. calcium, phosphorous, sodium, potassium and magnesium, iron, zinc, copper, manganese, cobalt and molybdenum, and aluminum, arsenic, barium, cadmium, chromium, nickel, lead, strontium and vanadium (Habib and Ibrahim, 2011).

Different varieties of date (*Phoenix dactylifera* L.) have quite variable amounts of macronutrients and micronutrients, but all varieties are excellent sources of dietary fiber and may therefore serve as important constituents of functional foods (Habib and Ibrahim, 2009). Unani system of Medicine is one of the oldest systems of medicine that deals with health and disease of human body and describes the action and uses of drugs mentioned in literature according to the different diseases. To some extent scientists validated that the claims by Unani scholars are true. In Unani classics, it is mentioned that the date is aphrodisiac and improves the quality and quantity of semen which now have been demonstrated that it increases sperm count as well as levels of estrogens and testosterone (El-Mougy *et al.,* 1991; Elgasim *et al.,* 1995; Ali *et al.,* 1999; El-Neweshly *et al.,* 2013; Orabia and Shawky, 2014). During the month of Ramadan, the Muslims remain empty stomach during whole day and the secretions may cause gastric irritation therefore the muslims used to have dates to break the fast for regularizing their gastric mucosa lining. Now it is also proved by researchers that the dates has anti ulcer and gastro-protective actions (Al-Qarawi *et al.,* 2003 and Al-Qarawi *et al.,* 2005). Thus it may be concluded that the dates have multiple actions and nutrients that help in keeping body healthy. So it is advocated that the *khurma* (date) may be included as one of the routine food supplement in day to day lives.

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