Review: Nutritional Properties and Benefits of the Date Fruits (*Phoenix dactylifera L.)*

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ABSTRACT:

Phoenix dactylifera L. is known as the date palm. The Phoenix dactylifera L. is a monocotyledonous woody perennial belonging to the Arecaceae family. Fruits are rich sources of carbohydrates, dietary fibers, certain essential vitamins and minerals. Phytochemical investigations have revealed that the fruits contain anthocyanins, phenolics, sterols, carotenoids, procyanidins and flavonoids, compounds known to possess multiple beneficial effects. Date pits are also an excellent source of dietary fiber and contain considerable amounts of minerals, lipids and protein. In addition to its dietary use, the dates are of medicinal use and are used to treat a variety of ailments in the various traditional systems of medicine. Preclinical studies have shown that the date fruits possess free radical scavenging, antioxidant, antimutagenic, antimicrobial, anti-inflammatory, gastroprotective, hepatoprotective, nephroprotective, anticancer and immunostimulant activities. This review presents a comprehensive analysis of the phytochemistry and validated pharmacological properties of date fruits and the seeds.

Keywords: Nutritional properties- Date fruits

INTRODUCTION:

Phoenix dactylifera L. is known as the date palm (**Al-Shahib and Marshall**, **2003**). The *Phoenix dactylifera L.* is a monocotyledonous woody perennial belonging to the *Arecaceae family*, which comprises 3000 species and 200 genera **(Jassim and Naji, 2010**). There are over 600 kinds of dates based on the shape and organoleptic properties (**Baliga *et al.*, 2011**). Date fruits are a significant component of the diet in the majority of the Arab countries with low cost. For Muslims, dates are of religious value and have been mentioned several times in the Quran. They are usually breaking their long day fasting with dates in the month of Ramadan (**Vayalil, 2002, Al-Farsi and Lee, 2008 and Baliga *et al.* 2011**).

Food and Agriculture Organization (FAO) reported in 2005, Saudi Arabia is the second producer of dates in the world (**Biglari *et al.*, 2009**). The annual production of dates palm is around 800 thousand tons in 2004 (**Alhussein, 2009**). The consumption of dates per household per day by Saudi families was 201.57 gm while the consumption of very ripe dates was 19.52 gm (**Al-Nozha and Al-Kanhal, 1996**).

Palm date fruits consist of three essential parts: date flesh which constitutes between 85% to 90% of date fruit weight (**Amira *et al.*, 2011**), date seed or pit which constitutes about 6 to 12% of the total weight of the mature date and skin which is a thin layer surrounding the fruit to protect the fleshy part **(El-Sohaimy and Hafez, 2010, Jassim and Naji, 2010 and Shafiei *et al.*, 2010**).

Dietary use of dates & date pit:

People eat either fresh or dried dates. The nutritional value of dates is ideally a high-energy food as they have a high content of sugar (**Franz et al. 2002 and Vayalil, 2002).** Dates have medicinal uses including anticancer, antihyperlipidemic, hepatoprotective activities and thereby serving as an essential healthy food in the human diet **(Biglari *et al.*, 2009).** The date fruit is used in folk medicine to treat the different infectious diseases probably because of their antibacterial ability, immuneomodulatory activity and antifungal property **(Baliga *et al.*, 2011).** The presence of pharmacological properties could be due to the presence of high concentrations of minerals and a variety of other phytochemicals of diverse chemical structure (**Baliga *et al.*, 2011).** Furthermore, aqueous extracts of dates were shown to have potent antioxidant activity, because they inhibit *in vitro* lipid and protein oxidation and possess free radical scavenging capacity **(Vayalil, 2002**). Date pits can be used to improve the nutritional value of incorporated food products. Also, extract shows hepatoprotective and antimicrobial activity in rat **(Biglari *et al.*, 2009, Jassim and Naji, 2010 and Baliga *et al.*, 2011).**

The aim of this review is to collect data on nutritional qualities and quantities of the date fruits.

Date Ripening Stages:

Dates ripen in four stages, which are known throughout the world by their Arabic denominations: the immature green, the mature

full colored, the soft brown and hard raisin-like stage of development (Kimri, Khalal, Rutab and Tamr, respectively**) (Al-Shahib and Marshall, 2003).**

Date Nutritional value:

The moisture content of dates decreases as they ripen (**Al-Shahib and Marshall, 2003)**. The moisture content of fresh date is 42.4 g/100 g and it is 15.2 g/100 g on dried dates (**Al-Farsi and Lee, 2008).**

Sugars in dates are the most prevalent compounds **(Mayo-Wilson *et al.*, 2011)** as they provide a rich source of energy to humans. The average energy of fresh and dried dates is 213 and 314 kcal/100 g, respectively **(Al-Farsi and Lee 2008)**. Types of carbohydrates in dates are glucose, fructose, sucrose, mannose, maltose, small amounts of cellulose and starch **(Al-Shahib and Marshall, 2003).** The total sugars increase as the fruit mature. It is ranging from 32.99-38.20% at the kimri stage and 77.97- 79.39% at the tamr stage. The sucrose contents increased rapidly as the fruits grown from the kimri to the khalal stage then it decreased at the tamr stage to a non-detectable level. The increase of the concentration of sugars from stage 1 to stage 4 is linked to the decrease in the water content of date during these stages (**Al-Shahib and Marshall, 2003)**.

The crude protein reduces as the fruit mature; it is 5.5-6.4% at the kimri stage and gradually decreases to 2.0-2.5% at the tamr stage **(Al-Hooti et al. 1997)**. Although dates are not a rich source of protein, they considered an important nutritional source because they contain essential

amino acids (**Franz *et al.*, 2002, Al-Shahib and Marshall, 2003 and Al-Farsi and Lee 2008).** The protein content of fresh and dried dates is 1.50 and 2.14 g/100 g, respectively. Increased amino acids content in dried dates are due to water reduction (**Al-Shahib and Marshall, 2003 and Al-Farsi and Lee, 2008).**

Fresh and dried dates contain 0.14 and 0.38 g/100 g respectively, of fat contents **(Al-Farsi and Lee 2008).** Fat content decreased as the fruit ripen. The fatty acids in dates are constituted of saturated oleic acid (50.10% of fatty acids) and linoleic acid (19.23%) and unsaturated acids lauric acid (10.24% of fatty acids), palmitic acid (9.83%), myristic acid (7.51%) and stearic acid (1.66%) **(Al-Shahib and Marshall, 2003).** Drying of dates increased fat contents **(Al-Farsi and Lee, 2008).**

Vitamins play role as antioxidants and help regulate immune function, maintenance of cell function for growth and reduce morbidity of infectious diseases **(Polyzos *et al.*, 2007 and Mayo-Wilson *et al.*, 2011).** Vitamins are important for synthesis of DNA and essential for metabolism of carbohydrates, fat and protein **(Baliga *et al.*, 2011).** Dates are regarded as a reasonable source of vitamins (**Al-Farsi and Lee, 2008).** It is considered a moderate source of riboflavin, niacin, pyridoxal and folate as 100 g of dates provide over 9% of the daily (RDA/AI) for adults **(Al-Farsi and Lee, 2008 and Baliga *et al.*, 2011).** Thiamin, retinol and ascorbic acid found in low concentrations in dried dates, as 100 g of dates provide less than 7% of the daily RDA **(Al-Farsi and Lee, 2008).**

Minerals are generally important as constituents of

hemoglobin, soft tissues, bones, teeth, muscle, and nerve cells (**O'Dell and Sunde, 1997). Appel *et al.*, (1997)** reported that 100 g of dates provides over 15% of the daily RDA for selenium, magnesium, copper and potassium and over 7% of manganese, iron, phosphorus, and calcium. Selenium has a role in the protection of body against oxidative stress; it acts as a coenzyme for the antioxidant enzyme glutathione peroxidase.

Importance of dietary fiber in health had been shown for more than 30 years as low fibers are associated with increased incidence of constipation, colon cancer, diabetes, heart disease and other disease (**Al-Shahib and Marshall, 2002 and Mohammad and Habibi, 2011).**

The crude fibers contents of the dates are decreased as fruit ripen; it was highest at the kimri stage (13.7%) and decreased rapidly to (3.6%) tamr stage **(Al-Hooti *et al.*, 1997, El-Zoghbi, 1997 and Al-Shahib and Marshall, 2002).**

Antioxidants are playing an important role in the prevention of cancers **(Wargovich, 2000),** inflammation, diabetes and cardiovascular disease **(Joseph, 1999).** Dates are considered as a good source of antioxidants **(Al- Farsi *et al.*, 2005 and Al-Farsi and Lee, 2008).** Al-Farsi reported that drying reduced the antioxidant content loss from 29.7% to 42.5% of antioxidants. This loss may be due to the breakdown of natural antioxidants after drying. Carotenoids act as antioxidants, which protect the cell from the deleterious effects of free radicals, and it is considered as an important

source of vitamin A (**Di *et al.*, 1991).** Compared to other dried fruits dates can be assumed as a moderate source of carotenoids **(Al-Farsi and Lee, 2008).** Fresh date contains 913 mg/100 gm of carotenoids where is dried contains 973 mg/100 gm. Drying process may responsible of absence anthocyanins from dried dates **(Al- Farsi *et al.*, 2005).** Average of anthocyanins is 0.87 mg/100 g. It is only found in fresh date especially the red color varieties.

Tannin content is high at the kimri stage it is ranged between 1.8% and 2.5% and decreased as the fruit ripen to 0.4% at the tamr stage **(Al-Hoot *et al.*, 1997).**

Phenolics can scavenge free radicals and stimulate the immune system **(Al-Farsi and Lee, 2008).** Phenolics increased after drying. Fresh date contains 193.7 mg /100 g of phenolics where is dried contains 239.5 mg /100 g because that dates can be considered as a good source of phenolics. **Mansouri *et al.*, (2005)** analyzed the phenolic profile of seven varieties of date and observed that they contain p-coumaric, ferulic and sinapic acids. Comparative studies with fresh and dried dates have shown that a significant increase in phenolic content ensues on drying, possibly due to the degradation of tannins and maturation of degradative enzymes at higher temperatures **(Mansouri *et al.*, 2005**). During drying tannins degradation by heat and maturation enzymes, result in release of phenolic compounds **(Maillard and Berset, 1995).**

Date seeds composed of 2.3–6.4% protein, 5.0–13.2 fat, 0.9 1.8% ash and phenolics (3102– 4430 mg). Seeds can be considered as a functional food because it is a rich source

of natural antioxidants and fiber (78–80 g/100 g) (**Mohammad and Habibi, 2011 and Tapas, *et al.*, 2008).** Seeds of dates contain also flavonoid (**Al-Farsi and Lee, 2007)** which confer health benefits as radical scavenging activities, reduction of chronic diseases, cardiovascular disorders and play as antioxidant **(Tapas *et al.*, 2008).**

Biological activities of dates

Role of Dates as an Antioxidant

For several years, a special interest has been paid to oxidative stress; situation of an excessive production of reactive oxygen species in the organism **(Saafi *et al.*, 2011).** A large number of experimental and epidemiological studies have indicated that the reactive oxygen species (ROS) contribute to organ injury and in many systems (**Pitsch *et al.*, 2010).** A building body of evidence suggests that oxidative stress plays a key role in the pathogenesis of micro- and macrovascular diabetic complications, the pathophysiology associated with atherosclerosis, neoplasia and neurodegenerative diseases. The increased oxidative stress in subjects with type 2 diabetes is a result of several abnormalities, including hyperglycemia, insulin resistance, hyperinsulinemia, and dyslipidemia (**Folli *et al.*, 2011)**. Therefore, a great deal of attention has focused on the naturally occurring antioxidant phytochemicals as potential therapy for cardiovascular diseases (**Das and Das, 2oo7**).

Antioxidants are compounds that can delay or inhibit the oxidation of lipids or other molecules by inhibiting the initiation or

propagation of oxidative chain reaction. Cellular antioxidant status determines the susceptibility to oxidative damage and is usually altered in response to oxidative stress **(Biglari, 2009).** The cellular antioxidant pool comprises antioxidant free radical scavenging enzymes like catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GPx). The cellular as well as their high capacity in scavenging free radicals related to various diseases hydroxyl radical (OH), and peroxyl radical (ROO), which are particularly reactive and are known to be a biological product in reducing molecular oxygen (**Biglari *et al.*, 2009).**

An antioxidant, which can reduce reactive free radicals, can prevent the oxidation of other molecules. Therefore, have health-promoting effects in the prevention of degenerative diseases (**Sanzari *et al.*, 2011).** Cocktail supplementation of antioxidants may have beneficial effects on diabetic nephropathy through discriminating reduction of blood glucose levels and inflammatory response **(Das and Das, 2oo7 and Park *et al.*, 2011)**. Beside the previous result, use of oral antioxidants in infertile men could improve sperm quality and pregnancy rates **(Ross *et al.*, 2010).** Beta-carotene supplementation appeared to increase cancer incidence and cancer mortality among smokers, whereas vitamin E supplementation had no effect, Selenium supplementation might have ant -carcinogenic effects in men (**Bardia *et al.*, 2008).**

Antioxidants can be classified into two groups according to their solubility; hydrophilic antioxidants (water-soluble), such as the

majority of phenolic compounds and ascorbic acid, and lipophilic antioxidants (fat-soluble) such as carotenoids and vitamin (**Alhussein, 2009 and Al-Farsi *et al.*, 2005).** The results presented here strongly suggest that date fruit contains compounds with potent antioxidant and ant -mutagenic activity **(Vayalil, 2002)** and have proved the crucial role of nutritional antioxidants to prevent the damage caused by toxic compound **(Pitsch *et al.*, 2010).** The primary free radical in most biological systems is the superoxide radical, which is in equilibrium with its protonated form hydroperoxyl radical. In general, this study reports that palm dates syrups can be a good source of natural antioxidant **(Farag, 2011).** Which act by several mechanisms, such as removal of free radicals, scavengers of $NO^{\cdot}$, $OH^{\cdot}$, and H_2O_2, chelation of Fe^{2+} ion, the ability to reduce transition metals (i.e., Fe^{3+} to Fe^{2+}), and the ability to prevent lipid peroxidation (**Al-Mamary *et al.*, 2011).** Aqueous date extract (1.9 mg/mL) was found to inhibit significantly the lipid peroxidation in a dose-dependent manner **(Vayalil, 2002).**

Dates have higher caloric content and more essential minerals and vitamins than most other fruits. There are at least 15 minerals in dates (boron, calcium, cobalt, copper, fluorine, iron magnesium, manganese, potassium, phosphorous, sodium, zinc and selenium). Selenium present in dates mainly in the form of selenocysteine residues that are an integral constituent of ROS-detoxifying selenoenzymes (GPx, thioredoxin reductase and

selenoprotein (**Steinbrenner & Sies 2009**). Date is also a good source of sodium, potassium, magnesium, calcium and iron. A fair amount of chlorine, copper, sulphur and phosphorus exist in date fruit. It also contains at least five vitamins including vitamin C, vitamin B1 (thiamine), B2 (riboflavin) and nicotinic acid (niacin). Enzymes play an important role in the conversion processes that takes place during formation and maturation of the date fruit. Polyphenol oxidase is responsible for biochemical changes of polyphenols to which the tannins belong; they are important in non-oxidative browning reactions of the date **(Biglari, 2009).**The medicinal use of extracts prepared from plant parts of the dates back to ancient times. Furthermore, it has been proposed that its antioxidant constituents account for its beneficial therapeutic effects **(Ljubuncic *et al.*, 2005).** Dates have phenolic compounds (mainly cinnamic acids) and flavonoids (flavones, flavonols and flavanones) that provide antioxidant activities **(Biglari, 2009)**. The antioxidant activity of phenolic compounds is a result of their redox properties, which can play an important role in absorbing and neutralizing free radicals, quenching singlet and triplet oxygen, or decomposing peroxides **(Farag, 2011).** Many of these phytochemicals achieve significant antioxidant capacities that may be associated with lower incidence and lower mortality rates of cancer. Another study concluded that pretreatment with antioxidants inhibited ROS production, protected antioxidant enzymes, and reversed hepatotoxicity (**Deng *et al.*, 2012).**

The compositional and sensory characteristics of three native sun-dried date (*Phoenix dactylifera*) varieties grown in Oman, comparing the antioxidant activity, anthocyanins, carotenoids, and phenolics for each different variety. Antioxidant compounds (phenolics and flavonoids) of the dates increased following storage as many fruits tend to lose stability during storage, but dates are relatively stable over a long period of time when refrigerate **(Vayalil, 2002).** Prolonged storage of dates under refrigeration or freezing is based mainly on the slowing down of enzyme activity. The effect of heat treatment (55°C/20 min) on polyphenol oxidase and peroxidase activities and total phenolic compounds in Algerian dates (Deglet Nour variety) at Tamar (fully ripe) stage and in dates stored for 5 months at ambient temperature and in cold storage (10°C) **(Biglari, 2009).** The total phenolic content (TPC) and total flavonoid content of the date palm (*Phoenix dactylifera*) fruits (DPF) have the antioxidant activities (AA). Even though it is apparent that the flavonoids were an important phenolic compounds contributing to the AA of DPF, it is also possible that other phenolic compounds could also contribute to the antioxidant properties of these types of date. It has been suggested that date fruit may contain a higher level of TPC among other fresh and dried fruit (**Biglari *et al.*, 2008).** Four free phenolic acids (protocatechuic acid, vanillic acid, syringic acid, and ferulic acid) and nine bound phenolic acids (gallic acid, protocatechuic acid, p-hydroxybenzoic acid, vanillic acid, caffeic acid, syringic acid, p-coumaric acid, ferulic

acid, and o-coumaric acid) were tentatively identifying **(Joseph *et al.*, 1999**). Dried fruits should be a greater part of the diet as they are dense in phenol antioxidants and nutrients, most notably fiber **(Vinson *et al.*, 2005).**

The chemical analysis of flesh and pit of two varieties of date palm fruit (Deglet nour and Alig) as well as the radical scavenging activity of their extracts was undertaken concerning the date pit composition, oils content was 10.13% in Deglet nour and 12.37% in Alig and the total sugars were less than 6% for the two varieties. In addition, ethyl acetate extracts from flesh Deglet nour, pit Deglet nour and pit Alig showed an important free radical scavenging activity towards 1-1-diphenyl-2-picrylhydrazyl (DPPH) free radical (**Chaira *et al.*, 2007).**

Date varieties had different levels and patterns of phenolic acids, most of which were present in the bound form. A significant amount of antioxidants, anthocyanins, and carotenoids will be lost during the sun drying of dates, whereas the total contents of phenolics and phenolic acids (both in free and bound) increased significantly **(Al-Farsi *et al.*, 2005 and Biglari *et al.*, 2009).** Antioxidants are known to have an inhibitory effect on the genotoxic action of several known mutagen. Total phenolics and total flavonoids of dates increased during long-term cold storage (4^oC) followed by an additional one week storage at 18^oC. In order to maximize antioxidant concentration, selected dates variety with a high initial antioxidant compounds should be kept in a refrigerator for up to six month **(Biglari, 2009 and Baliga *et***

***al,*. 2011**). *In vivo* studies by **Yeh *et al.*, (2008**) have also shown that oral feeding of p-coumaric acid present in date increase the expression of antioxidant enzyme genes in rats.

Dates as an Antihyperlipidemic Activity

Atherosclerosis is a disease of the large arteries; it is the primary cause of heart disease and stroke. Epidemiological studies have revealed that it is the underlying cause of about 50% of all deaths in the world **(Lusis, 2002).** The decreasing of the concentrations of high-density lipoprotein cholesterol and increasing of low-density lipoprotein cholesterol are the major cause of Coronary heart disease **(Baliga *et al.*, 2011).**

Studies showed that feeding rats with diet containing defatted date seed flour at 1.5%, 2.5% and at 5.2% concentration caused decreasing in plasma triglycerides, total cholesterol and low density lipoprotein **(Al-Maiman, 2005). Rock *et al.*, (2009)** investigated that after 4weeks Medjool or Hallawi dates consumption, the VLDL-cholesterol levels tended to be reduced (by 8 or 15%, respectively, with value of $0.1 > p > 0.05$). As well as in human, the dietary fiber feeding reduces blood cholesterol concentration. The findings of these studies suggested that diet based on date seed fiber had a good major source of dietary fiber (**Evans *et al.*, 1992 and Kattak, 2002).**

Date Plant leaves (DPL) extracts could have a protective effect against hyperlipidemia through improvement of lipid profile **(Abuelgassim, 2010).** However, the total lipids in the date decreased with the

maturity stage progressing **(Amira *et al.*, 2011).** The fat component of the date skin plays a potential protective role for the date contents **(Shafiei *et al.*, 2010).**

Dates as a Hepatoprotective activity

Liver diseases are one of a global problem and the major threats to public health, with high endemicity in developing countries **(Asha and Pushpangadan, 1998 and Adewusi and Afolayan, 2010).** The majority of the hepatotoxic chemicals damage liver cells by inducing lipid peroxidation and other oxidative damages (**Recknagel, 1983 and Adewusi and Afolayan, 2010).** Liver plays an essential role in transforming and clearing metabolites and xenobiotics, and is susceptible to the toxicity from these agents **(Hrvoje *et al.*, 2009).**

According to Muslims believe that ‘‘who eats seven dates every morning will not be affected by poison or magic on the day he eats them’’ **(cited by Miller *et al.*, 2003, Bruck *et al.*, 2001, Bastway *et al.*, 2008, Jassim and Naji, 2010, and Al-Qarawi *et al.*, 2001).** Several studies assess the ability of date flesh and pits in prevention or treatment of some of the toxic actions of different substances such as carbon tetrachloride (CCl_4), thioacetamide (TAA) and dimethoate poisoning on the liver of rats. Which are model for acute viral hepatitis, induced hepatotoxicity, elevation in plasma enzyme and bilirubin concentration and increase significantly serum glucose level **(Al-Qarawi *et al.*, 2001, Bruck *et al.*, 2001, Al-Qarawi *et al.*, 2004,**

Bastway *et al.*, 2008 and Pitsch *et al.*, 2010).

Studies showed that feeding rats with the aqueous extracts of date flesh or pits reduce significantly the levels of the hepatic markers enzymes (alkaline phosphatase, transaminases, gamma-glutamyl transferase and lactate dehydrogenase), hepatic levels of malondialdehyde and concomitantly increased the levels of antioxidant enzymes **(Burtis and Ashwood, 2001, and Bastway *et al.*, 2008).** In addition, date pit extract shown its ability to restore the normal functional status of the poisoned liver, and protect against subsequent carbon tetrachloride hepatotoxicity on the liver of rats (**Al-Qarawi *et al.*, 2004, Jassim and Naji, 2010, and Mohammad and Habibi, 2011).** Moreover, Studies confirmed that selenium, ferulic acid, anthocyanin, caffeic acid, quercetin, chlorogenic acids, proanthocyanidins, β-carotene,apigenin and luteolin are the date constituents which have all been reported to acquire hepatoprotective effects against the CCl_4-induced hepatic damage in rodents **(Lin and Tome, 1988, Al-Qarawi *et al.*, 2004 and Pitsch *et al*,. 2010). Similarly, Al-Qarawi *et al.*, (2004)** showed that the daily oral consumption of an aqueous extract of dates was protective agonist CCl_4 poisoning by 80% for flesh and 70% for pits of dates.

In many other studies illustrated that the mechanism of hepatoprotective effects is possibly related to polyphenolic compounds (flavonoids and phenolic acids), β-sitosterol **(Lin and Tome, 1988, El-Mougy *et al.*, 1991, Al-Qarawi *et al.*, 2004 and Bastway *et al.*, 2008)** and

trace elements (selenium, zinc, copper and manganese). In addition, the content of vitamin C in the date flesh and pits (0.179% and 0.137%, respectively) may also play a role in hepatoprotection **(Kowalski *et al.*, 1990, Al-Qarawi *et al*,. 2004, Bastway *et al.*, 2008, Pitsch *et al.*, 2010 and Al-Mamary *et al.*, 2011).** Logically assume the existence of these compounds may contribute for the hepatoprotective effects of the date extract **(Baliga *et al.*, 2011).** However, the accurate mechanism by which the date flesh induces its hepatoprotective activity is uncertain **(Lin and Tome, 1988, Bruck *et al.*, 2001, Al-Qarawi *et al.*, 2004, Bastway *et al.*, 2008).**

Likely that the mechanism of antioxidants in aqueous date fruit extract may be related to the ability of its active compounds to detoxify free radicals and to inhibit lipid peroxidation in the liver and protein oxidation. It is clear also that the anti-inflammatory effect of polyphenols through its ability to inhibit the production of nitric oxide and tumor necrosis factor α (TNF-α) to help in hepatoprotective ability. It is suggested that the flavonoids in date palm (*Phoenix dactylifera*) fruit can also contribute to the hepatoprotective ability through inhibition of cytochrome P-450 aromatase **(Rikans *et al.*, 1987, Al-Qarawi *et al.*, 2004 and Bastway *et al.*, 2008).**

Dates and Diabetes

Diabetes is the most common endocrine disorder, which can lead to hyperglycemia which is related to microvascular and macrovascular complications **(Mokhtari *et al.*, 2008, Aryangat and Gerich, 2010**

and Ovbiagele *et al.*, 2011). Prevalence of diabetes increased recently due to rapid social and lifestyle change **(Miller *et al.*, 2002).** The incidence of diabetes is expected to increase in the future **(Mokhtari *et al.*, 2008).**

The glucose: fructose ratio of the date was approximately 1.5:1 at the kimri stage, but decreased to 1:1 at the tamr stage **(Al-Hooti *et al.*, 1997).** The ratio of glucose to fructose in dates can be of great interest because fructose is about twice as sweet as glucose and it is considered less diabetogenic than glucose **(Biglari, 2009).**

Using low glycemic index (GI) diets are useful in the management of diabetes **(Brand-Miller *et al.*, 2003). El-Mougy *et al.*, (1991) and Gilbertson *et al.*, (2001)** showed that consuming low-GI diet improved glycaemic control and quality of life for children with type 1 diabetes. Dates can be classified as low (GI) **(Ovbiagele *et al.*, 2011)** that reduces HbA_{1c} **(Brand-Miller et al., 2003, Jenkins et al., 2008 and Alkaabi et al. 2011).** Low (GI) likely to be due to the high fructose in dates (**Miller *et al.*, 2003).**

There is evidence to support dates benefits when mixed with meals in terms of glycaemic control (**Brand *et al.*, 1991 and Gilbertson *et al.*, 2001**). Composition of various types of dates alone or in mixed meals with plain yoghurt may be of benefit in glycemic control in diabetic patients (**Miller *et al.*, 2002 and Miller *et al.*, 2003).** There does not result in significant postprandial glucose excursions (**Alkaabi *et al.*, 2011).** Diabetic patients cannot be worrying for consumption of six to eight tamer and eight to 10 rutab dates **(Miller *et al.*, 2003).**

Dietary fiber content of date changes during ripening **(Al-Shahib and Marshall, 2002).** Fiber consumption helps in regulation of glucose absorption and insulin secretion and decreased HbA1c **(Jenkins *et al.*, 2008).** So high-fiber diets are recommended for diabetic patients (**Mohammad and Habibi, 2011).** Magnesium and zinc in dates stimulate the synthesis and secretion of insulin. Manganese also mimics insulin properties, which lead to hypoglycemic effect (**Mokhtari *et al.*, 2008).**

In 2009, Budin found that palm oil tocotrienol-rich fractions reduced the blood glucose level in streptozotocin induced diabetic rats **(Budin *et al.*, 2009 and Mard *et al.*, 2010)** whereas the alcoholic extract of seeds of dates decreased the blood glucose in male diabetic rats (**Mokhtari *et al.*, 2008).** The fruit leaves of the date are used as a popular medicine in the United States and southwest Iran to reduce blood glucose level in diabetes **(Rock *et al.*, 2009, Aryangat and Gerich, 2010).**

Treatment with *Phoenix dactylifera* (date palm) leaf extract (PDE) had great raise concentration of plasma insulin in alloxan-induced diabetic rats. The release of insulin from the pancreas results in antihyperglycaemic activity. The mechanism of action of the dates could be similar to that of hypoglycaemic sulphonylureas, as closure of K^+–ATP (adenosine 5-triphosphate) channels. This result in membrane depolarisation and increased Ca^{2+} influx, this will be an initial step in insulin secretion **(Mard *et al.*, 2010).**

Dates and cancer

Free radicals are generated during everyday metabolic processes in a normal cell. Also, generated endogenously (mitochondria, metabolic process, inflammation etc.) or from external sources. Generation of ROS is associated with tissue injury or DNA damage, which are pathological conditions associated with infection, aging, mitochondrial DNA mutations and cancer. Excessive production of ROS or inadequacy in a normal cell's antioxidant defense system (or both) can cause the cell to experience oxidative stress and the increased ROS may play a role in cellular processes associated with initiation and development of many cancers **(Lakshmipathi, *et al.*, 2009). Saafi *et al.*,(2011)** found that the aqueous date palm fruit extract have protective activity against oxidative damage. It is possible that polyphenolic compounds (flavonoids, anthocyanins and phenolicacids), and trace elements (selenium, copper, zinc andmanganese), in addition to vitamin C present in the date palm fruit are the responsible compounds for this protection. In fact, **Vayalil (2002)** proved the antioxidant and the antimutagenic activity of the aqueous date palm fruit extract, monitored by the inhibition of lipid peroxidation and protein oxidation and by the aptitude to scavenge superoxide and hydroxyl radicals *in vitro*.

Other studies by **Ishurda and John (2005)** have shown that the glucans isolated from the date fruits possess antineoplastic effects in experimental study. They believed that the antitumor activity could be correlated to their structure (1→3)-β-d-

glucan linkages. Treatment with the β-glucan containing media caused a dose-dependent increase in apoptosis, which concomitantly decreased the cell viability of the PC-3 cells *in vitro* (**Fullerton *et al.*, 2000).**

REFERENCES:

Abuelgassim, A.O. (2010). Effect of flax seeds and date palm leaves extracts on serum concentrations of glucose and lipids in alloxan diabetic rats. Pak. J. Biol. Sci.,13:1141-5.

Adewusi, E.A. and Afolayan, A. J. (2010). A review of natural products with hepatoprotective activity. J. Med. Plants Res.,4:1318-34.

Al- Farsi, M., Alasalvar, C., Morris, A., Baron, M., Shahi, F. (2005). Comparison of Antioxidant Activity, Anthocyanins, Carotenoids, and Phenolics of Three Native Fresh and Sun-Dried Date (Phoenix dactylifera L.) Varieties Grown in Oman. J. Agric. Food Chem., 53: 7592-7599.

Al-Farsi M. A. and Lee C.Y. (2008). Nutritional and functional properties of dates: a review. Crit. Rev. Food Sci. Nutr., 48: 877-87.

Al-Farsi, M. A. and Lee, C.Y. (2007). Optimization of phenolics and dietary fibre extraction from date seeds. Food Chem., 108: 977-985.

Al-Hooti, S., Sidhu, J. S and Qabazard, H. (1997). Physicochemical characteristics of five date fruit cultivars grown in the United Arab Emirates. Plant Foods Hum. Nutr., 50:101-13.

Alhussein, M. A. (2009). Study of penetration curves of

solar heat into date fruits as a mean to control insects. Journal of Engineering Science and Technology, 4 (3): 251 – 263.

Alkaabi, J. M., Al-Dabbagh, B., Ahmad, S., Saadi, H. F., Gariballa, S. and Ghazali, M. A. (2011). Glycemic indices of five varieties of dates in healthy and diabetic subjects. Nutr. J., 10: 59.:59.

Al-Maiman S. (2005). Effect of Date Palm (Phoenix Dactylifera) Seed Fibers on Plasma Lipids in Rats. J. Kig saaud Univ., Vol. Agric. Sci., 2: 117-123.

Al-Mamary, M., Al-Habor, M. and Al-Zubairi, A. S. (2011). The *in vitro* antioxidant activity of different types of palm dates (Phoenix dactylifera) syrups; Arabian Journal of Chemistry, article in press.doi:10.1016/j.arabjc.11.014.

Al-Nozha, M and Al-Kanhal M. (1996). " Percentage of famillies consuming food item." Aluation Of The Nutritional Status Of The People Of Saudi Arabia, p 218.

Al-Qarawi, A. A., Abdel-Rahman, H. A. and El-Mougy, S. A. (2001). Hepatoprotective activity of licorice in rat liver injury models. J. Herbs Spices Med. Plants. 8: 7–14.

Al-Qarawi, A., Mousa, H.M., Ali, B.H., Abdel-Rahman, H. and El-Mougy S. A. (2004). Protective effect of extracts from dates (Phoenix dactylifera L.) on carbon tetrachloride– induced hepatotoxicity in rats. Intern. J. Appl. Res. Vet. Med., 2: 176-180.

Al-Shahib, W. and Marshall, R. J. (2002). Dietary fibre content of 13 varieties of datepalm (Phoenix dactylifera L.). J. Food Sci., 37:719-72.

Al-Shahib, W. and Marshall, R.J. (2003). The fruit of the date palm: its possible use as the best food for the future? Int. J. Food Sci. Nutr., 54: 247-59.

Amira, E., Guido, F., Behija, S., Manel, I., Nesrine, Z. and Lotfi, A. (2011). Chemical and aroma volatile compositions of date palm (Phoenix dactylifera L.) fruits at three maturation stages. Food Chemistry, 127:1744–1754

Appel L. J., Moore, T. J. and Obarzanek, E. (1997). A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. N Engl. J. Med., 336:1117-24.

Aryangat, A.V. and Gerich, J. E. (2010). Type 2 diabetes: postprandial hyperglycemia and increased cardiovascular risk. Vasc Health Risk Manag 6:145-55.

Asha, V. V. and Pushpangadan, P. (1998). Preliminary evaluation of the anti-hepatotoxic activity of Phyllanthus kozhikodianus, Phyllanthus maderspatensis and Solanum indicumFitoterapia, 59: 255-259.

Baliga, S, Baliga, V. and Kandathil S. (2011). A review of the chemistry and pharmacology of the date fruits (Phoenix dactylifera L.). Food Research International, 44: 1812-22.

Bardia, A., Tleyjeh, I. M. and Cerhan, J. R. (2008). Efficacy of antioxidant supplementation

in reducing primary cancer incidence and mortality: systematic review and meta-analysis. Mayo Clin. Proc., 83: 23-34.

Bastway, A. M., Hasona, A.-S. N. and Selemain A.-H. H. (2008). Protective Effects of Extract from Dates (Phoenix Dactylifera L.) and Ascorbic Acid on Thioacetamide-Induced Hepatotoxicity in Rats.

Biglari, F. (2009). Assessment Of Antioxidant Potential Of Date (Phoenix Dactylifera) Fruits From Iran, Effect Of Cold Storage And Addition To Minced Chicken Meat; Universiti Sains Malaysia (QK495.P17 B593 2009 f rb).

Biglari, F., Abbas, F. M. and Alkarkhi, E. A. (2008). Antioxidant activity and phenolic content of various date palm (Phoenix dactylifera) fruits from Iran. Food Chemistry, 107: 1636–1641.

Biglari, F., AlKarkhi, A. F. M. and Mat, E, A. (2009). Cluster analysis of antioxidant compounds in dates (Phoenix dactylifera): Effect of long-term cold storage. Food Chemistry, 998–1001.

Brand, J. C., Colagiuri, S., Crossman, S., Allen, A., Roberts, D.C. and Truswell, A. S. (1991). Low-glycemic index foods improve long-term glycemic control in NIDDM. Diabetes Care,14: 95-101.

Brand-Miller, J. C., Petocz, P. and Colagiuri, S. (2003). Meta-analysis of low-glycemic index diets in the management of diabetes: response to Franz. Diabetes Care, 26: 3363-4.

Bruck, R., Shirin, H. and Aeed, H. (2001). Prevention of

hepatic cirrhosis in rats by hydroxyl radical scavengers. J. Hepatol., 35:457-64.

Budin, S. B., Othman, F., Louis, S. R., Bakar, M. A. and Das, S, M. J. (2009). The effects of palm oil tocotrienol-rich fraction supplementation on biochemical parameters, oxidative stress and the vascular wall of streptozotocin-induced diabetic rats. Clinics (Sao Paulo), 64: 235-44.

Burtis, C. A. and Ashwood, E. R. (2001). Tietz's Fundamentals of Clinical Chemistry. Philadelphia:WB Saunders, : 565 (2).

Chaira, N., Ferchichi, A., Mrabet, A. and Sghairoun, M. (2007). Chemical composition of the flesh and the pit of date palm fruit and radical scavenging activity of their extracts. Pak. J. Biol. Sci., 10: 2202-7.

Das, S. and Das, D. K. (2oo7). Resveratrol: a therapeutic promise for cardiovascular diseases. Recent Pat Cardiovasc. Drug Discov., 2: 133-8.

Deng, Y., Xu, Z., Liu, W., Yang, H., Xu, B and Wei, Y. (2012). Effects of Lycopene and Proanthocyanidins on Hepatotoxicity Induced by Mercuric Chloride in Rats. Biol. Trace. Elem. Res., 146(2): 213-23.

Di, M.P., Murphy, M. E. and Sies, H. (1991). Antioxidant defense systems: the role of carotenoids, tocopherols, and thiols. Am. J. Clin. Nutr., 53:194S-200S.

El-Mougy, S. A., Abdel-Aziz, S. A., Al-Shanawany, M. and

Omar, A. (1991). The gonadotropic activity of Palmae in mature male rats. Alexandria J. Pharmac. Sci., 5:156–159.

El-Sohaimy, S. A. and Hafez, E.E. (2010). "Biochemical and Nutritional Characterizations of Date Palm Fruits (Phoenix dactylifera L.)" Journal of Applied Sciences Research, 6:1060-67.

El-Zoghbi, M. (1997). Biochemical changes in some tropical fruits during ripening. Food Chemistry, 49: 33-37.

Evans, A. J., Hood, R. L., Oakenfull, D. G. and Sidhu, G. S. (1992). Relationship between structure and function of dietary fibre: a comparative study of the effects of three galactomannans on cholesterol metabolism in the rat. Br. J. Nutr., 68: 217-29.

Farag, A. A. (2011). Effect of Dates During the Tapering Period on Some Antioxidants,Glucose and Record Level for 50m Freestyle Young Swimmers; World J. Sport. Sci., 3 (201): 1106-1110.

Folli, F., Corradi, D. and Fanti, P. (2011). The Role of Oxidative Stress in the Pathogenesis of Type 2 Diabetes Mellitus Micro- and Macrovascular Complications:Avenues for a Mechanistic-Based Therapeutic Approach. Curr Diabetes Rev., 7(5): 313-24

Franz, A., Jörn, B. and Udo Censkowsky, P. (2002). Date Palm Natural, 1st edition.

Fullerton, S. A., Samadi, A. A., Tortorelis, D. G., Choudhury, M. S., Mallouh, C., Tazaki, H., & Konno, S. (2000). Induction of apoptosis

in human prostatic cancer cells with betaglucan (Maitake mushroom polysaccharide. Molecular Urology, 4: 7−13.

Gilbertson, H. R., Brand Miller, J. C., Thorburn, A. W., Evans, S., Chondros, P. & Werther, G. A. (2001). The effect of flexible low glycemic index dietary advice versus measured carbohydrate exchange diets on glycemic control in children with type 1 diabetes. Diabetes Care, 24: 1137-43.

Hrvoje, J., Cˇedomila, M., Biserka Radosˇevic´-Stasˇic´b. (2009). Dose- and time-dependent effects of luteolin on carbon tetrachloride-induced hepatotoxicity in mice Experimental and Toxicologic Pathology, 61: 581-89.

Ishurda, O., & John, F. K. (2005). The anti-cancer activity of polysaccharide prepared from Libyan dates (Phoenix dactylifera L.). Carbohydrate Polymers, 59: 531−535.

Jassim S. A. and Naji, M. A. (2010). *In vitro* Evaluation of the Antiviral Activity of an Extract of Date Palm (Phoenix dactylifera L.) Pits on a Pseudomonas Phage. Evid Based Complement Alternat Med., 7: 57-62.

Jenkins, D. J., Kendall, C. W. and McKeown-Eyssen, G. (2008). Effect of a low-glycemic index or a high-cereal fiber diet on type 2 diabetes: a randomized trial. JAMA, ٣٠٠: ٥٣-٤٢.

Joseph, J. A., Shukitt-Hale B. and Denisova, N. A. (1999). Reversals of age-related declines in neuronal signal transduction, cognitive, and motor behavioral deficits with

blueberry, spinach, or strawberry dietary supplementation. J. Neurosci.,19: 8114-21.

Kattak M. (2002). Physyologically effect of dietary complex carbohydrates and its metabolite roll in some desease. Pakistan Journal of Nutrition, 4:161-168.

Kowalski, D. P., Feeley, R. M. and Jones, D. P. (1990). Use of exogenous glutathione for metabolism of peroxidized methyl linoleate in rat small intestine. J. Nutr.,120:1115-21.

Lakshmipathi, k. L., Kumar, B, Koul, S., Maroni, P. and Koul, H. (2009). Oxidative stress in prostate cancer. cancer Letters, 282: 125-163.

Lin, C. N. and Tome, W. P. (1988). Antihepatotoxic principles of Sambucus formosana. Planta Med., 54: 223-4.

Ljubuncic, P., Portnaya, I., Cogan, U., Azaizeh, H. and Bomzon, A. (2005). Antioxidant activity of Crataegus aronia aqueous extract used in traditional Arab medicine in Israel. J. Ethnopharmacol.,101: 153-61.

Lusis A. J. (2002). Atherosclerosis Nature, 14: 233–241.

Maillard, M. N., and Berset, C. (1995). Evolution of antioxidant activity during

Mansouri, A., Embarek, G., Kokkalouc, E., & Kefalas, P. (2005) Phenolic profile and antioxidant activity of the Algerian ripe date palm fruit (Phoenix dactylifera). Food Chemistry; 89: 411−420.

Mard, S. A., Jalalvand, K., Jafarinejad, M., Balochi, H. and Naseri, M. K. (2010). Evaluation of the antidiabetic and antilipaemic activities of the hydroalcoholic extract of phoenix dactylifera palm leaves and its fractions in alloxan-induced diabetic rats. Malays J. Med. Sci.,17: 4-13.

Mayo-Wilson, E., Imdad, A., Herzer, K., Yakoob, M.Y. and Bhutta Z. A. (2011). Vitamin A supplements for preventing mortality, illness, and blindness in children aged under 5: systematic review and meta-analysis. BMJ., 343:d5094. doi: 10.1136/bmj.d5094.:d5094.

Miller, C. J., Dunn, E. V. and Hashim, I. B. (2002). Glycemic index of 3 varieties of dates. Saudi Med. J., 23: 536-8.

Miller, C. J., Dunn, E. V. and Hashim, I. B. (2003). The glycaemic index of dates and date/yoghurt mixed meals. Are dates 'the candy that grows on trees'? Eur. J. Clin. Nutr., 57: 427-30.

Mohammad, B. and Habibi, N. (2011). Date Seeds: A Novel and Inexpensive Source of Dietary Fiber, International Conference on Food Engineering and Biotechnology.

Mokhtari, M., Sharifi, A. and Sabzevari, A. (2008). Effect of palm seed alcoholic extract on the blood glucose and lipids concentration in male diabetic rats. Sci. J. Kurdistan Univ. Med. Sci., 12(4):8–15.

O'Dell, B. L. and Sunde, R. A. (1997). Introduction. In Handbook of Nutritionally Essential Minerals; O'Dell, B.

L., Sunde, R. A., Eds.; Dekker: New York, 1-12.

Ovbiagele, B., Markovic, D. and Fonarow, G. C. (2011). Recent US Patterns and Predictors of Prevalent Diabetes among Acute Myocardial Infarction Patients. Cardiol. Res. Pract., 14: 561-5.

Park, N. Y., Park, S. K. and Lim Y. (2011). Long-term dietary antioxidant cocktail supplementation effectively reduces renal inflammation in diabetic mice. Br. J. Nutr., 106:1514-21.

Pitsch, N. T., Witsch, B. and Baier, M. (2010).Comparison of the chloroplast peroxidase system in the chlorophyte Chlamydomonas reinhardtii, the bryophyte Physcomitrella patens, the lycophyte Selaginella moellendorffii and the seed plant Arabidopsis thaliana. BMC Plant Biol., 10: 133.

Polyzos, N. P., Mauri, D. and Tsappi, M. (2007). Combined vitamin C and E supplementation during pregnancy for preeclampsia prevention: a systematic review. Obstet Gynecol Surv., 62: 202-6.

Recknagel, R. O. (1983). A new direction in the study of carbon tetrachloride hepatotoxicity. Life Sci., 33:401-8.

Rikans, L. E., Smith, C. R. and Zannoni, V. G. (1978). Ascorbic acid and cytochrome P-450. J. Pharmacol. Exp. Ther., 204: 702-705.

Rock, W., Rosenblat, M. and Borochov-Neori, H. (2009). Effects of date (Phoenix dactylifera L., Medjool or Hallawi Variety) consumption

by healthy subjects on serum glucose and lipid levels and on serum oxidative status: a pilot study. J. Agric. Food Chem., 57: 8010-7.

Ross, C., Morriss, A. and Khairy, M. (2010). A systematic review of the effect of oral antioxidants on male infertility. Reprod Biomed Online, 20: 711-23.

Saafi, E. B., Louedi, M. and Elfeki, A. (2011). Protective effect of date palm fruit extract (Phoenix dactylifera L.) on dimethoate induced-oxidative stress in rat liver. Exp. Toxicol. Pathol., 63:433-41.

Saafi, E. B., Louedi, M., Elfeki, A., Zakhama, A., Najjar, M. F., Hammami, M. and Achour, L. (2011). Protective effect of date palm fruit extract (Phoenix dactylifera L.) on dimethoate induced-oxidative stress in rat liver. Experimental and Toxicologic Pathology, 63: 433–441.

Sanzari, J. K., Wambi, C., Lewis-Wambi, J.S. and Kennedy, A. R. (2011) Antioxidant dietary supplementation in mice exposed to proton radiation attenuates expression of programmed cell death-associated genes. Radiation Res., 175:650-6.

Shafiei, M., Karimi, K. and Taherzadeh, M. J. (2010). Palm date fibers: analysis and enzymatic hydrolysis. Int. J. Mol. Sci.,11:4285-96.

Steinbrenner, H., & Sies, H. (2009). Protection against reactive oxygen species by selenoproteins. Biochimica et Biophysica Acta, 1790: 1478−1485.

Tapas, A. R., Sakarkar, A. M., & Kakde, R. B. (2008). Flavonoids as nutraceuticals: A review. Tropical Journal of Pharmaceutical Research, 7:1089-99.

Vayalil, P. K. (2002). Antioxidantandant imutagenic properties of aqueous extract of date fruit(Phoenix dactylifera L. Arecaceae). J. Agric. Food Chem., 50: 610–7.

Vinson, J. A., Zubik, L., Bose, P., Samman, N. and Proch, J. (2005). Dried fruits: excellent in vitro and in vivo antioxidants. J. Am. Coll. Nutr., 24: 44-50.

Wargovich, M. J. (2000). Anticancer properties of fruits and vegetables. J. Hort. Sci., 35:573-75

Yeh, C. T., Ching, L. C., & Yen, G. C. (2008). Inducing gene expression of cardiac antioxidant enzymes by dietary phenolic acids in rats. The Journal of Nutritional Biochemistry, 20: 163−171

استعراض: الخصائص الغذائية وفوائد ثمارالبلح (*Phoenix dactylifera L.*)

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الملخص العربي

الأسم العلمي لثمار البلح هو Phoenix dactylifera L. ينتمي للعائلة Arecaceae. تعتبر ثمار البلح من المصادر الغنية بالكربوهيدرات والألياف الغذائية والفيتامينات والمعادن. أظهرت نتائج التحليلات أن ثمار البلح تحتوي علي العديد من المركبات مثل الأنثوسيانين، الفينولات ، الكاروتنيد ، البروسياندين ، الفلافونيدات وترجع التأثيرات المفيدة لثمار البلح لهذه المركبات. حيث أن لهذه المواد تاثير كمضادات لحدوث الأكسدة ،الطفرات ، السرطان ، نمو الميكروبات، الألتهابات كذلك الثمار لها القدرة علي حماية القناة الهضمية ، الكبد ، تنشيط الجهاز المناعي.

الكلمات الافتتاحية: الخصائص الغذائية للبلح- ثمار البلح