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REVIEW ARTICLE

EFFECTS OF DATES FRUIT (*PHOENIX DACTYLIFERA L.*) IN THE FEMALE REPRODUCTIVE PROCESS

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ABSTRACT

Date fruit has a high nutritional value that has benefits for health. It has been known the effects of date fruit on the male reproductive system to strengthen the spermatogenesis process, sex hormone regulation, to increase gonadotropin and aphrodisiac activity, but very little research of the dates benefits on the female reproductive system. Date's may has effect on oocyte quality, the interaction of sperm and ovum, implantation and early embryonic development through an antioxidant mechanism. The antioxidants of date fruit can also be useful for the DNA repair from pro-oxidant damage. The components of phytoestrogens in the date fruit can regulate reproductive hormones. Date fruit contains many minerals, thus to prevent anemia, helps the involution process and improve the breast milk quality. However, the difference date fruit varieties have different levels of the active compound. This paper reviews the potential benefit of date fruit to improve the function of female reproductive system.

INTRODUCTION

Date fruit (*Phoenix dactylifera L.*) is often encountered and not only in the Middle East State as a producer of dates. Date fruit contains a very high nutritional value because its components. It is generally consumed during fasting in Ramadan, but now the date fruit can be consumed any time and available in everywhere. Date fruit has very sweet taste and fragrant. This fruit contains a lot of carbohydrates, vitamins, and minerals (Ardekani *et al.*, 2010). Now, date fruit began to be developed for the treatment of various diseases. Some of the benefits of the date fruit have been studied as an anti-inflammatory, anti-diabetic, nephroprotective, hepatoprotective, anti-oxidants and fertility (Hafez and El-Sohaimy, 2010). Little is known regarding the effect of dates to female reproductive system.

Date fruit compositions

Date fruit contains many compounds that are needed by the body. Nutritional compounds that contained have an important role in the development and function of the reproductive system. Date fruit contains glucose to reach 81.9 to 91.2% (Al-Tamim, 2014). However, a study conducted by Chaira *et al.*, (2007) showed that the glucose levels of dried dates of Deglet Nour and Aliotypes of Tunisia contains only about 60%. Date fruit also contain important minerals such as Cu, Na, Ca, Mg, P K, Zn and Fe are useful for the metabolism of normal (Hafez and El-Sohaimy, 2010). Moreover, the content of vitamins in the date fruit is also very high (vitamin B1, B2, B3, B6, and vitamin C). Vitamin C content reached 10.52 mg / 100g.

The difference between some of the studies was occurred and it is influenced by soil conditions, environmental factors and varieties. Date fruit also consist of fiber (16.2%), protein (5.22%), carbohydrates (62.5%) and fat (8.49%) (Vyawahare *et al.*, 2009). Some proteins are also found in the seeds of dates such as albumin, globulin, prolamin and gluten, soluble protein and about 5-6% of the total protein content. The majority of date seeds contain fatty acids such as capric, lauric, myristic, palmitic, stearate, linoleic, linolenic, arachidonic (Boukouada and Yousfi, 2009). Total phenolic content in the date seeds around 48.64 mg / 100g. Phenolic acids are found in the form of gallic acid, protocatechuic acid, p-hydroxybenzoic acid vanillic, caffeic acid, siringic acid, p-coumaric, ferulic acid, m-coumaric acid and o-coumaric acid (Al-Farsi and Lee, 2007). Flavonoids are phenolic compounds that are important. Types of flavonoids that contained in the date fruit is proantosinidin, flavonoid glycosides and anthocyanins. Yun *et al.* (2006) identified 13 flavonoid glycosides like luteolin, quercetin and apigenin on date fruit khalal stage.

Reproductive benefits of date fruit

Previously, there has been no study conducted to explore the benefits of date fruit extracts to increase women's reproductive capacity such as the formation of hormones and ovum. However, studies in male rats have been done to show that the dates date fruit can improve the process of spermatogenesis, the concentration of testosterone, FSH and LH and sperm (Adaay and Mattar, 2012; Saryono, *et al.*, 2016). This result is consistent with previous research by Abdallah *et al.* (2009). Various phytochemical compounds such as genistein, vitamin A and the mineral selenium have been reported to protect of testicular function against a variety of oxidative stress and has gonadotropin activity. Date fruit extracts contain a variety of

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components that work as potent antioxidants such as flavonoids, phenolic, vitamin C, E, and A. It can protect the sperm cell membranes against lipid peroxidation, thus decreasing the percentage of dead sperm and maintain normal sperm morphology. Date fruit works as an antioxidant to stop the chain reaction due to oxidative stress. Oxidative stress will produce a pro-oxidant molecules or reactive oxygen species, which can also occur in women. Activity, diet and environmental factors have the potential to give rise to free radicals in women.

The high free radicals in the body can lead to infertility in women. Free radicals can affect oogenesis, embryonic microenvironment and thus a direct effect on oocyte quality, the interaction of sperm and ovum, implantation and early embryonic development (Safarnavadeh and Rastegarpanah, 2011). The antioxidant content of the date fruit has been widely demonstrated (Siahpoosh, *et al.*, 2011; Nehdi *et al.*, 2010; Afq *et al.*, 2013; Saafi *et al.*, 2011; Saryono *et al.*, 2015). High polyphenol content in the date fruit (50.2 mg/g), especially epicatechin, and catechin determine antioxidant activity, both in vivo and in vitro. Therefore the date fruit also has the potential to boost fertility in women, thus need to examine. The growth of the fetus requires a supply of nutrients to build the cell's DNA. Stem cell DNA damage and abnormalities in the information copying process can occur in the fetus. Consumption of date fruit can repair DNA and prevent genetic disorders. This was confirmed by the results of studies showing that the date seed extract can decrease DNA damage normal cells in pancreatic cancer (Habib *et al.*, 2014). Date fruit contains phytochemical compounds such as phytosterols and phytoestrogens. Phytoestrogens in the diet of pregnant women can be found in the amniotic fluid and umbilical blood (Engel *et al.*, 2006).

Phytoestrogens are useful for modulating estrogen the body, has a pro-apoptotic activity and anti-oxidants. From previous studies, administration of date fruit in rat food can increase growth hormone and estrogen plasma levels (Elgasim *et al.*, 1995). Results of other studies have shown that the date pollen can significantly increase the levels of estrogen and progesterone (Mokhtari *et al.*, 2008; Moshfegh, *et al.*, 2016). Pregnant women are very need of nutritious food for the mother and fetus. Some foods that can be consumed directly affect fetal growth. Dates fruit contains multivitamin and complete nutrition. In studies conduct previously, the provision of multivitamins during pregnancy may accelerate the growth and development of the fetus, so avoid prematurity (Szeto *et al.*, 2009). During pregnancy, women need a lot of nutrients, including calcium for fetal growth. Calcium pregnant women should share with the fetus, resulting in a risk to the reduction of bone density and strength. Date fruit contains a lot of mineral resources such as selenium, magnesium, manganese and copper. This component is necessary for bone health and avoids loss. Calcium is a component of trace elements in the date fruit be beneficial in inhibiting the phosphate diesterase enzyme to prevent degradation of cAMP, thus improving the quality of the ovum.

Zink also play a role in improving the quality of ova through hormone metabolism, organization of DNA and RNA, protein synthesis and cell division bio-membrane stabilization of the cell nucleus chromatin. Amino acids and fatty acids can

stimulate directly GnRH secretion which further regulates the production of estrogen and progesterone hormones and primary and secondary sex organs. Potassium ions are needed to improve the levels of estrogen and progesterone, to affect the release of pulsatile GnRH from the hypothalamus, as the primary regulator of fertility status and androgenic (Adaay and Mattar, 2012). Date fruit also contains vitamin A and B. Vitamin A is necessary for the production of ovum to the fullest. Vitamin B helps optimize macronutrient metabolism, muscle mass, and lower levels of serum homocysteine, cholesterol and C-reactive protein as a marker of inflammation. The decrease inflammation help reduce levels of the hormone cortisol thus increasing the anabolic effects of dates.

Delivery process benefits in date fruit

During of the delivery process, pregnant women need a lot of energy to push the fetus out. This process will lead to fatigue, and lethargy. Dates contain simple high glucose (glucose, sucrose and fructose) as a source of energy to maintain the energy of the body during childbirth (Hafez and El-Sohaimy, 2010). The sugar found in date fruit is an easily absorbed by the body so it is safe and reduces the risk of gestational diabetes. Although the consumption of date fruit can improve post-prandial glucose, thus it does not significantly affect fasting blood glucose levels (Rock W *et al.*, 2009). A study Al-Kuran *et al.* (2011) in a prospective study on 69 women who consumed 6 seeds date fruit per day for 4 weeks before delivery could significantly reduce the need for labor induction and additional delivery time as well as more enjoyable, although did not significant to the outcome of labor. Date fruit can increase the body's energy back in a relatively short time, especially in women during childbirth. Date fruit contains 50-57% glucose, 1.8 to 2% 2-4% protein and fiber. Results of previous studies by Chaira *et al.* (2007), showed that the glucose content of dates between 35.57 to 77.88 g / 100g. Varieties Korkobbi is a species with the highest glucose content. Energy in women post-partum have very big role to the recovery. Process consumption of carbohydrates from the date fruit as a main meal during labor, it may prevent nausea and shorten delivery time (Second periode) (Rahmani and Moslem, 2009). An important finding from other studies show that consumption of honey syrup of dates can accelerate natural childbirth procedures. Drinking of date fruit syrup during labor may prevent prolonged labor (Kordi *et al.*, 2010). The nutritional value of dates is also related to their fiber content. The majority of fiber content in the date fruit is an insoluble fiber such as hemicellulose, cellulose, and lignin. Insoluble fiber increases the body's ability and speed of the food when it is processed in the digestive tract, reducing transit time and prevents constipation (Habib *et al.*, 2014). Post-partum mother is suggested not straining during defecation, to avoid the occurrence of uterine prolapse or strain on episiotomy wound. The fiber that contained in date fruit can help defecation process runs smoothly. Consumption of 8 dates fruit can donate approximately 5 grams of fiber.

Involution process benefits of date fruit

Date fruit contains hormones (potuchsin) which may affect vasoconstriction in the uterus, thus increasing uterine involution process. Vagina's damage during delivery can cause pain and inflammation. Dates consumption may reduce pain

and inflammation risk among post partum mother. A previous study showed that the extract water in the date fruit have an effect as a topical analgesic and as an anti-inflammatory (Zhang *et al.*, 2013).

Fetus benefits of date fruit

Fetal growth is influenced by his mother's adequate supplies of energy. The adequacy of nutrition and do not have anemia during pregnancy will maintain a supply of nutrients to the fetus. The fetal growth will be optimal. In the previous study, dates contain many types of iron of about 2.9 to 6 mg / 100g (Nehdi *et al.*, 2010). This component is needed to make hemoglobin which is essential for transporting oxygen in the blood. Iron deficiency cause anemia. Anemia during pregnancy will be heavier because of the increased blood volume (hemodilution) and the need for fetal development. Date fruit also contain calcium that necessary for the formation of blood and bone. In addition to containing calcium, date fruit also contains phosphorus, potassium and magnesium. This component is essential for the development of the teeth below the gum growth in the fetus while in the womb.

Breast milk benefits of date fruit

Date fruit can help establish good breast milk. Date fruit contains minerals iron and calcium. Date fruit consumption during breastfeeding would improve the quality of breast milk that rich in nutrients and vitamins. High glucose content in the date fruit can increase energy breastfeeding mothers.

Conclusions

Date fruit (*Phoenix dactylifera L*) contains many macronutrients, minerals, vitamins and antioxidants. Components in the date fruit may plays a role in the female reproductive process through oogenesis process, strengthening of oocytes, hormonal regulation, strengthening of pregnancy, fetal organogenesis, childbirth, uterine involution and milk production. Nevertheless, it should be proved that the role of dates in the reproductive system, so that utilization can be optimized.

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