



THE EFFECT OF EATING DATE POMACE ON INCREASING HEMOGLOBIN LEVELS IN A SAMPLE OF WOMEN

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Abstract

This research was performed to see the effects of dates pomace (fiber concentrate or press cake) powder on levels of blood hemoglobin, glucose as well as urine of women's sample ranges from 13-30 years old. The experiment was carried out on twenty five women distributed into 5 groups of 5 women each. One group was the healthy kept as control group. All women were consumed about 3 gm. of date pomace (press cake) daily by taking 2 tablet of powder after each meal / one month. The results showed that daily consumption of 3 grams of date palm press cake (date concentrate) increased significantly ($P < 0.05$) the blood hemoglobin and decreased blood glucose serum and urine levels. This study recommends that intake of date press cake as a fiber may be beneficial for diabetic patients who suffer from anemia as their fibers induce antidiuretic activity and enhance serum urine. The results of this study are based on researches that rely on plant products as a treatment for some diseases better than relying on chemical drugs which have side effects as well as high prices for the consumer, which is already suffering from high prices of medicines.

Key words : Date palm cake press (Pomace or date concentrate)-Women-Hemoglobin-glucose-urine.

Introduction

One of the oldest trees in the world is the date palm tree *Phoenix dactylifera* L., and has been planted in North Africa and the Middle East since ancient times (Zaid & de Wet, 2002). The Middle East region (Saudi Arabia, Iraq, the United Arab Emirates), North Africa (Algeria, Tunisia, Egypt, Libya and the Maghreb) is one of the most prolific producing countries with 90% (Manickavasagan *et al.*, 2012). Dates availability at these areas has played an important role in the social life of the population in terms of socially nutritious habits and religious beliefs of dates and their benefits as food (El-Sharnouby *et al.*, 2009) or its effect on public health because it contains all the nutrients that contribute to the treatment of many diseases, including obesity (Hamdia, 2016). Scientific studies have proved the importance of dates and their great role in the prevention of many diseases when taken in moderate quantities because they contain various antioxidants and polyphenols for many of the inflammatory diseases, including cancer, diabetes, and against many types of pathogens and yeast (Arshad, *et*

al., 2014; Mohamed, and Al-Okbi 2005). In addition, dates supply large source of carbohydrates as sugars 44-88%, and high proportion of easily digestible dietary fiber 6.4-11.5%, minerals, and vitamins (Al-Farsi & Lee, 2008). Date seeds represented 5.6-14.0% of the entire fruit weight, and its seed contain about 0.2-0.5% of oil. Dates also a good source of a significant amounts of minerals, including phosphorus, potassium, sodium, zinc, manganese, magnesium, copper, iron, fluorine and selenium, some of minerals varying in content from 0.1 to 1000 mg per 100 g dry case (Mohammad, *et al.*, 2014). The food industry for dates as dates syrup (Aldebis) to throw a high percentage of the secondary by-product dates, which are not used and are aimed at, knowing that these wastes are an excellent source of dietary fiber, phenols and various antioxidants, which can be used in the process of food fortification of many food products (Al-Farsi *et al.*, 2007; Abdellaziz, *et al.*, 2014). The amount of dates produced has increased to 7.5 million tons in 2010 (FAO, 2011), and there is a possibility to increase the production of about 720,000 tons/year of the dates by-product, including date seeds, taking into account 10% of the total date mass, these wastes are

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usually used as fertilizer Supplementary to soil (Vandepopuliere *et al.*, 1995). Studies showed the importance of the oil extracted from date's seed in the preparation of a lot of cosmetics and in the preparation of some medicines for many skin diseases (Devshony *et al.*, 1992). In addition of that, tons of date palm by-product are discarded daily through the date processing industries leading to environmental problems (Chandrasekaran and Ali, 2013). By-product wet up to 70% moisture, so bulky can be left that as press cake constitutes about 30% of the weight of ingoing dates and will deteriorate quickly and become a disposal problem or as animal feed (Besbes *et al.*, 2005). It is also possible to use the by-product in the manufacture of syrup and alcoholic drink because of the leakage of a lot of fiber and sugars feed the end of the date center and these quantities of leakage depends on extraction efficiency. The studies confirmed that the date by-product were excluded from the seeds has high percent of protein, ranging from 3.62 of the Shahal Dates to 5.24 of the Mabseeli. They also found fiber amount ranged between 77.75-80.1% and 25.39-33.81%, respectively, for dates variety (Al-Farsia *et al.*, 2007). It were investigated that date by-products can serve as a good source of natural antioxidants and could potentially be considered as a functional food beneficial in and their applications to the pharmaceutical (Reem, *et al.*, 2017) and nutraceutical industries in the development of natural compound-based industrial products (Mohamed and Al-Okbi, 2005). Thus, it would be useful to develop the efficient and cost-effective method to utilize these dates for the production of value-added products through many suitable applications for this waste. So the aim of this study is to present the mineral contents especially iron content on elevating the hemoglobin percentage and other blood parameters in women samples who are suffering from low and medium anemia by consuming daily dried powder tablets of date press cake (pomace) or concentrated fiber (cf).

Materials and Methods

Date fruits: Date obtained at the maturity stage since October and November of 2016 to 2017. Date press cake (date pomace) *Phoenix dactylifera* L. variety is Zahdi purchased from Al-Saffa Date and Its Products Factory/ Baghdad/Iraq were used in this work.

Press cake powder preparation

Five kilos of press cake (70% of moisture content) obtained, then most of the water discharged by using laboratory centrifuge (model RC 28 S, USA) at 8000 g for 10 min, then date seeds discarded. Press cake dried on 65°C in ventilate oven (name of the oven) for 6hrs,

then powdered finely by using laboratory's blender, then keep it in polyethylene sac and put it in refrigerator until it used for the experiment. Then the powder filled within empty tablet manually.

Dose calculation

It was used the Lab. balance (Satorius BL3100 Max 3100 gm d=0.1 g) for weighing the samples for analysis. The weight of the consumption dose daily was shown in table 1.

Experiment protocol

Twenty five women were conducted on Alrawabi secondary school /Alrashed district age (13-30 years old), who were suffering from low and mild anemia. In addition, five participants were healthy, non-smoking women, the things that are affected by donors in terms of sensitivity, eating disorders, diabetes, should not be considered to be inconsistent with other medicines and should not affect dietary behavior and followed a typical eating pattern including 3 meals/day as control. The weight, length and the body mass index of all women were taken before starting the study. All women were consumed with about 3 gm. of date pomace (press cake) daily by taking 2 tablet of powder after each meal (1 tablet contain approximately (0.5 g). Then two tablets after each meal/ three meals daily for 30 days were consumed by women. That means about 3 grams of dried powder of date fibers as press cake was consumed daily as in table 2. Base line blood sugar, hemoglobin and uric acid were recorded on day 0 and at the end of the study.

Anthropometrics parameters

One measure important for assessing overweight is; determining body mass index (BMI).

Body Mass Index

The body mass index BMI shows the relative weight of the length and has a direct relationship with the total body fat content of the human body. BMI is used as a universal weight control to always avoid and control obesity. BMI is estimated in body weight kg / square body length cm as (WHO, 1997). Table 1 shows weight ratings of adult body according to body mass index and used in this study. Before the start of the experiment, weights and lengths of the bodies of the female participants were recorded in this experiment using a sensitive body measurement seca scale with 0.5 kg, and a special length studio-meter for the gym with 0.5 cm accuracy. I would like to point out that the weight and height were taken after removing the shoes and in light clothing to ensure that the weight and length of the women were determined. Also during the period of the sports

experience and for a period of three months, we used to ask the women participants monthly to inquire about many of the prosecutions about the nutritional status of the dates provided to them and that there are some symptoms or any health problems and to confirm them continuity taken capsules of the date palm with control to reduce food intake.

Sensory evaluation of date press cake powder

After preparing the date pomace (date press cake) powder, the researchers evaluated them in terms of color, flavor, taste, ease of dissolving and chewing in the mouth before giving instructions to the participants in the experiment. The powder is tested through 10 people who are working in the laboratory of the Market Research & Consumer Protection Center and they are specialist with organoleptic evaluation.

Chemical and physical Analysis

Chemical and physical analyses: The date press cake powder is evaluated for moisture, ash, protein, fat and fiber using standard methods [AOAC, 2000]. Chemical analysis of dry matter (DM) and dietary fibers (DF) was conducted according to AOAC methods (AOAC, 1984).

Minerals determination

Two gram of sample (dates pomace) was placed in drycrucible and then desiccate in a muffle furnace (C CARBOLITE, Parsons Lane, Hope, S33 6RB, England) at 550°C for 4 hours. After cooling the crucible, diluted deionized water and with the addition of 5 ml of hydrochloric acid, boiled, cooled at room temperature, filtered in a volumetric flask capacity of 100 ml, then completed also with deionized water. Then the metals were measured are potassium, magnesium, sodium, iron, and zinc concentrations in the samples were assessed with an atomic absorption spectrophotometer (Schimadzo, AA-7000). Pb, Fe, Cu, Co, Ni, and Cd were determined according to the method (Horwitz, 2000) by using Flam Atomic absorption (Fame Emission) from company Shimadzo (Model AA-7000), in lab of consumer research and protection center/Baghdad Univ./Iraq.

Biochemical analysis in blood serum

Blood samples (10 ml) were taken after fasting for 12 hours at the beginning and ending of the experiment. Then rapid centrifugation process was performed to separate the serum, followed by freezing directly at 80 ° C. It was used the enzymatic method using elitech kit (via Hitachi machine) from French company of Feppim 717 for determining blood hemoglobin, glucoe and uric acid as urine according to (Arkan, *et al.*, 2012; Nafiseh, *et al.*, 2015. Hemoglobin concentration (Hb) was determined using Hemoglobin-Drabkin kit., and uric acid by different waves of spectrophotometer (Kaneko, 1997).

All chemicals analysis was conducted in the Al-Mahmmoydia general hospital/Baghdad/Iraq.

Statistical Analysis

The Statistical Analysis System- SAS (2012) program was conducted to see the effect of difference factors in study parameters. Least significant difference –LSD test (ANOVA) was conducted to significant compare between means in this study.

Results and Discussion

Results of this study showed that all women in the sample were in normal weight (BMI= 18.5-24.9) for all ranges of women's old in this study as in table 3.

There were significant acceptable for the date press cake powder in their organoleptic properties. So that it is very safe for consuming by human who are conscious for their health.

Table 5 showed the chemical composition of date

Table 1: Amount of date press cake powder (gm.) in the tablet.

Net wt. of powder in tablet (gm)	Wt. of filled tablets	Wt. of empty tablets	No. of tablets
0.4580	0.5477	0.0897	1
0.4832	0.5772	0.0940	2
0.4890	0.5845	0.0955	3
0.4623	0.5536	0.0913	4
0.4836	0.5775	0.0939	5
0.4771	0.5726	0.0955	6
0.5189	0.6074	0.0885	7
0.5287	0.6230	0.0943	8
0.4876	0.5804	0.0923	Mean (Ave.)

Table 2: Ranking of overweight and Obesity by BMI (kg/m² Obesity Class).

BMI (kg/m ²)	Obesity Class	Kind of body status
< 18.5		Underweight < 18.5
18.5-24.9		Normal 18.5-24.9
25.0-29.9		Overweight 25.0-29.9
I 30.0-34.9	I	Obesity I 30.0-34.9
35.0-39.9	II	II 35.0-39.9
40	III	Extreme Obesity III 40

Source adapted from: Preventing and Managing the Global Epidemic of Obesity. Report of the world Health Organization Consultation of Obesity. WHO, Geneva. June 1997.

Table 3: Shows the % of Overweight and Obesity of ladies sample.

25-30 years	21-24 years	16-20 years	13-15 years	Age range/BMI
24.5	18.6	21.0	19.1	BMI

Table 4: Organoleptic evaluation of the date pomace (press cake) powder.

Total acceptability	Odors	Chew ability	Consistency	Taste	Color	No.
10	10	10	10	10	9	1
9.9	10	10	10	9	8	2
10	10	10	9	9	10	3
9	10	9	9	10	9	4
10	10	9	10	8	8	5
10	10	10	9	9	7	6
10	10	10	9	10	9	7
9	10	10	10	9	7	8
9	10	9	8	8	9	9
10	10	9	9	9	10	10

press cake. All data were the average value of the triplicates. High contents of dry matter 82.5%, represents a good source of protein, carbohydrate and fat that were 4.9%, 41.3 and 3.0% respectively. The analysis of dietary fibers also demonstrated that dates press cake is very rich of dietary fiber and ashes 34.5%, 6.6% respectively. These findings identical to (Al-Shahib, 2003; Al-Farsi, 2007) who explained the importance of dietary fibers (6.4–11.5%) in date's especially insoluble fibers (84–94% of total fibers) for human health. These fibers are important for accelerating GIT activity and reducing the risk of constipation. Also, others were demonstrated that dates fibers had a preventive effect against some diseases, particularly the digestive system cancers (Nicklas, *et al.*, 1995; Kritchevsky, 1986).

Table 5: Composition of dried date press cakes.

Dry matter %	82.5
Crude protein %	4.9
Moisture %	9.7
Crude fat %	3.0
Crude fiber %	34.5
Ash %	6.6
CHO	41.3

All data are mean of triplicate.

Minerals analysis of concentrated date press cake powder prepared from Al-Zahdi pulp date showed in Table 4. It was found date press cake is a good source of many minerals. Therefore, date pomace an important source of these basic minerals of public health, and perhaps date pomace will contribute to the nutritional balance of all people. Results of this study showed that date press cake contains a large amount of magnesium, Iron, cobber, and manganese, while there were a little of contamination of heavy metal such as cd, pb, and chromium, may be due

to the kind of pots which was used during processing of date syrup. This result will complement available data on food composition by (Nnorom, *et al.*, 2007).

Table 6: Minerals determination in date pomace (press cake).

Mn	Mg	Fe	Cr	Pb	Cd	Cu	Minerals
0.1542	1.0997	0.6129	0.9142	0.1450	1.1944	0.4708	PPM (µg/ml)

Effect of daily consumption of press cake on blood hemoglobin levels

Results of this study showed a significant differences effect of blood hemoglobin for all the age ranges by date pomace consumption as shown clearly in table 1. Women's with ages 13-15, 16-20 and 21-24 years old who had mild anemia 10.0, 9.3 and 9.0 mg/dl respectively showed a significant elevation of anemia after one month of date concentrate consumption that elevated to 11.3, 11.5 and 11.3 respectively. While other women's with age 25-30 years old who had no anemia maintained their blood hemoglobin after dates consumption as shown in table 7. So, this was a good index of the safe date palm concentrate consumption. This finding conformity to the results mentioned by (Mohan Jain, 2015) who stated that dates content of vitamins and minerals such as iron as a component of hemoglobin in red blood cells, that is very important to determine the balance of the oxygen in the blood and then carries it from lung to different tissues for potential health benefits. So, consuming dates must be promoted as health of infant, youth, healthy adults and patient with chronic diseases. Also, (Al-Farsi, *et al.*, 2005) presented date by-products serve as a good source of natural antioxidants and that could potentially be considered as a functional food or functional food ingredient.

Table 7: Effect of consuming dried date pomace (press cake) on blood Hemoglobin % of the women.

Date pomace consuming		Age group
After treatment	Before treatment	
11.3	10.1	13-15 years
11.5	9.3	16-20 years
11.3	9.0	21-24 years
13.6	13.5	25-30 years
13.6	13.6	C
1.976 *	2.014 *	LSD value
* (P<0.05)		

Effect of daily consumption of press cake on blood glucose levels

Results of this study showed significant reduction in blood glucose for all the age ranges as shown clearly in table 2. Although dates contain carbohydrates, dietary

fiber and naturally sugar such as fructose, glucose, and sucrose but, there were no elevation in blood glucose for all old ranges of women. Blood glucose reduction may be attributed to the fiber content in dates that comes in two forms, soluble and insoluble. Soluble fiber has been shown to help control diabetes high blood sugar as well as lowering high cholesterol. Also the insoluble fiber increases the moving waste smoothly through the colon (Vayalil, 2002; Chandrasekaran, and Ali, 2013).

Table 8: Effect of consuming dried date pomace (press cake) on blood glucose % of the women.

Date pomace consuming		Age group
After treatment	Before treatment	
88.9	90.3	13-15 years
93.0	95.9	16-20 years
88.5	90.3	21-24 years
87.0	92.2	25-30 years
88.5	89.0	Control (5)
4.618 *	5.133 *	LSD value
*(P<0.05)		

Effect of daily consumption of press cake on blood uric acid levels

The results showed a clear statistical decrease ($P<0.05$) in blood urea for all the old ranges as shown clearly in the table 9. This may be attributed to the date concentrate contents of fiber. Fiber, that positively affects the blood glucose, absorbs, cholesterol and enhanced the bowel movement and clearance the food waste (Al-Farsi, and Lee, 2008; Chandrasekaran, and Ali, 2013). Also, the importance of fiber may be attributed to accelerated intestinal movement, which in turn reduces the risk of constipation. In addition, the date fiber is an antagonist for many diseases; including gastrointestinal cancer as investigated by (Kritchevsky, 1986; Nicklas, *et al.*, 1995).

Table 9: Effect of consuming dried date pomace (press cake) on blood uric acid % of the women.

Date pomace consuming		Age group
After treatment	Before treatment	
2.4	2.3	13-15 years
2.9	3.3	16-20 years
3.2	4.8	21-24 years
4.8	5.1	25-30 years
3.5	4.2	C
1.088 *	1.267 *	LSD value
*(P<0.05)		

Conclusion

The results of this study proved that the dates pomace (date press cake) contain a high percentage of basic minerals such as potassium, calcium, magnesium,

manganese especially iron, which suffers from iron shortage of many people in the third world countries who suffer from blood anemia and iron component is essential in the composition of blood. In addition, the dates pomace contains a high proportion of carbohydrates to supply the body with calories that is very important for the vital activities of the body. Also, dates pomace contains high percentage of the fiber soluble and insoluble necessary against many diseases, including diabetes, gastrointestinal diseases and cancer. Many previous studies have shown the possibility of producing large quantities of dates pomace and using them as supplementary products in terms of containing a high percentage of fiber and important minerals, as well as the possibility of using them to supplement the various food products (Scott-Thomas, 2013). Further studies are suggested for the use and studding more of this product for natural, cheap pharmaceutical and medical product instead of chemical product to discard the side affects of these chemicals medicine. The nutritional value of date fruit and its by-products are rich in dietary fibers, selenium, carotenoids and other antioxidants which may prevent oxidative damage, preparation of fiber-based foods, such as bread, biscuits, and cakes and dietary supplements (Najafi, 2011). Also, it was presented date pomace fiber could be used as an alternative to wheat bran, and it may provide a valuable contribution to dietary fiber intakes (Almana & Mahmoud, 1994). So that, it can be recommended that results of this study are based on researches that rely on plant products as a treatment for some diseases better than relying on chemical drugs which have side effects as well as high prices for the consumer, which is already suffering from high prices of medicines.

Acknowledgements

The investigator acknowledge gratefully the all staff of the Ai-Raboi School for their help preparing the sample of girls and gratefully to the Physician Hattem Al-Ethaowy for his guides, supporting material (Pathological analysis) and moral for this study.

Recommendation

There are thousands of tons of leftover dates left aside daily without the benefit of many of the factories of molasses (Al-debes) center, which is used frequently in Iraq and neighboring Arab countries. Throwing the by-products leads to major environmental problems, so there is an urgent need to find solutions and appropriate applications of these by-products because they contain many components of food and therapeutic.

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