

EFFECT OF DATE PALM (*Phoenix dactylifera*) ON LIPID PROFILE IN EXPERIMENTAL RATS

*Aminu Isa Musa

Department of Bioscience, Suresh Gyan Vihar University, Jaipur India

ABSTRACT: The aim of the study was to investigate the effect of date palm extract on the lipid profile parameters. Rats were divided into four groups, normal control (received water), group 1 treated with 1000mg/kg, group 2 with 2000mg/kg and group 3 with 3000mg/kg body weight of the extract for four weeks. The result of the study showed that the level of lipid profile parameters were not significantly ($p>0.05$) different between group 1 (1000mg/kg), group 2 (2000mg/kg) and group 3 (3000mg/kg) and the control. A non significance increase ($p>0.05$) is seen in High density lipoprotein (HDL) in rats of group 1 (1000mg/kg), group 2 (2000mg/kg) and group 3 (3000mg/kg) when compared with the control. Also, Low density lipoprotein (LDL) decreases non significantly in group 2 (2000mg/kg) and group 3 (3000mg/kg) when compared with the control. However, no significant changes were obtained in TC, VLDL and AI. The results suggest that dates have no significant effect on lipid profile.

INTRODUCTION

Dates are among the sweetest of fruits and up to 70% of their weight may be sugar. Dates have been cultivated for more than four thousand years in the dry, desert like regions of North Africa and Middle East. They provide an important source of carbohydrates (Janik *et al.*, 1974). Date palm may well be the world's oldest food producing plant. It is a member of the palm family, a group of trees with no branches topped by large crowns of leaves, each leaf form to 10 to 20 feet in length. It is a cousin of lilly orchids and grasses. The dates appreciates having its feet in the water and its head in the sun, therefore it thrive naturally in Oasis. These are typically dry, warm place of little rainfall but an adequate underground water supply (Hilda, 1987).

The fruit is known as dates, the fruits English names as well as Latin species name *dactylifera* both came from the Greek word for "fingers" *dactylos*, because of the fruits elongated shape. Dates are oval cylindrical, 3-7cm long and 2-3cm diameter and when unripe range from bright red to bright yellow in colour, depending on variety. Dates contain a single seed about 2-2.5cm long and 6-8mm thick. Three main cultivar groups of date exist. Soft (e.g. halaroy, barthee, khadarawy, madjool) Semi dry (e.g. dary: deglet noor) and Dry (e.g. thoory). The type of fruits depends on the glucose; fructose and sucrose content (Al- Shahib and Marshall, 2003).

The whole plant contains carbohydrate, alkaloids steroids and tannins. The phenolic profile of the plant revealed the presence of mainly cinnamic acid, Flavonoids glycosides and flavonols. (mahran *et al.*, 1976).

Anthocyanins were detected only in fresh dates the TLC analysis also showed that the major carotenoid pigment present in date is lutein followed by α -carotene. Date contain at least six vitamins including small amount of vitamin B1 (thiamine,) B2 (riboflavin), nicotinic acid (niacin) and vitamin A. Enzyme such as phytase, invertase and peroxidase have been isolated in dates, other isolated chemical constituencies include α -D gulcan, heteroxylon and galac tomannans (mahran *et al.*, 1976).

MATERIALS AND METHOD

Date Palm

Date palm sample: the date palm that was made into crude powder used was obtained from fruits and vegetables market, Jagatpura jaipur. It was stored under room temperature.

Albino Rats:

Albino rats weighing 100-200kg were used for the study. They were obtained from Department of Biological Sciences. They were housed at the animal house, and were fed normal food. They were allowed to acclimatize for one week.

Preparation of aqueous date palm extract

At first, Dates fruits were washed from dust with tap water and then rinsed with distilled water and distributed in a clean bench and allowed to stand to dryness under shade. They were made into crude powder by grinding with mortar and pestle. Extraction was then performed by soaking 100g of the crude powder in 1 liter of distilled water. The mixture was left for 24 hours at room temperature. This was again filtered to obtain the filtrate. The filtrate was then subjected to evaporation at temperature of 45°C in a drying cabinet. The residue was then weight (lorke, 1983).

Experimental design:

A total of 16 albino rats were used in this experiment. The animals were divided into four groups (including control). Four rats per each group.

GROUP 1: This represent control group. The animal in this group received normal water.

GROUP 2: The animals in this group were administered 1000mg/kg of the extracts.

GROUP 3: The animals in this group were administered 2000mg/kg of the aqueous extracts.

Group 4: The animals in this group were administered 3000mg/kg of the aqueous extracts

COLLECTION OF BLOOD SAMPLE

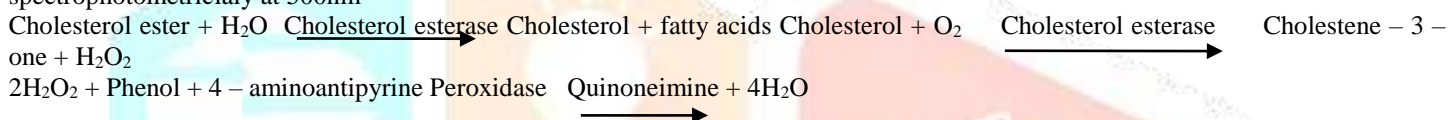
The animals were sacrificed on the 29th day. The blood sample were collected in a test-tube and allowed to stand for 10mins before centrifugation at 3000rpm. The serum was then obtained using Pasteur pipette into labeled dry clean bottles.

BIOCHEMICALS ANALYSIS**ESTIMATION OF SERUM TOTAL CHOLESTEROL**

Serum total cholesterol (TC) was quantified by enzymatic method using Randox Kit (Allantain *et al.*, 1974).

PRINCIPLE

The cholesterol is determined after enzymatic hydrolysis and oxidation. The indicator quinoneimine is formed from Hydrogen peroxide and 4- aminoantipyrine in the presence of phenol and peroxidase. The absorbance of the dye is measured spectrophotometrically at 500nm

**PROCEDURE**

Three test tubes were set up and labeled blank, test and standard as follows;

	Blank	Test	Standard
Serum (µl)		10	
Standard Cholesterol (µl)			10
Distilled Water (µl)	10		
Reagent (µl)	1000	1000	1000

The test tubes were mixed, incubated at 37°C for 5 minute and the absorbance of the standard and test read against the blank.

$$\text{Serum total cholesterol (mg/dl)} = \frac{\text{absorbance of test} \times \text{Conc. Of standard}}{\text{Absorbance of standard}}$$

ESTIMATION OF SERUM HDL-C

This was done by enzymatic method of Burstein *et al.*, (1970) using Randox Kit

PRINCIPLE

Low density lipoproteins, very low density lipoproteins and chylomicron fractions are precipitated Quantatively by the addition of Phosphotungstic acid in the presence of magnesium ions. After centrifugation, the cholesterol concentration in the high density lipoprotein fraction, which remains in the supernatant, is determined Spectrophotometrically at 500nm.

PROCEDURE

Into a centrifuge tube, 200ul of serum and 500ul of precipitant (0.55mmol/L phosphotungstic acid and 25mmol/L magnesium chloride) were added, mixed and allowed to stand for 10 minute at room temperature. The tube was centrifuged for 10 minute at 4000rpm. Three test tube was then set up and labeled blank standard and test.

	Blank	Test	Standard
Serum (µl)		10	
Standard Cholesterol (µl)			10
Distilled Water (µl)	10		
Reagent (µl)	1000	1000	1000

The tubes were then mixed and incubated for 5 minute at 37°C and the absorbance of the sample and standard were measure against the reagent blank at 500nm.

Serum HDL-C (mg/dl) = $\frac{\text{Absorbance of test} \times \text{Conc. Of standard}}{\text{Absorbance of standard}}$

ESTIMATION OF SERUM TRIGLYCERIDE

This was assayed by the method of Tietz (1990) using Randox kit

PROCEDURE

The triglycerides are estimated after an enzymatic hydrolysis with lipase. The indicators are a Quinoneimine formed from H₂O₂, 4-aminophenazone and 4-chlorophenol under the catalytic influence of Peroxidase

Triglyceride + H₂O $\xrightarrow{\text{lipase}}$ Glycerol + fatty acid

Glycerol – ATP $\xrightarrow{\text{Glycerol Kinase}}$ Glycerol -3- Phosphate + ADP

Glycerol -3- Phosphate + O₂ $\xrightarrow{\text{Glycerol Phosphate oxidase}}$ Dihydroxyacetone Phosphate + H₂O₂

H₂O₂ + 4- aminophenazone + 4- chlorophenol $\xrightarrow{\text{Peroxidase}}$ quinoneimine + HCl + 4H

PROCEDURE

Three test tubes were set up as follows:

	Blank	Test	Standard
Serum (μl)		10	
Standard Cholesterol (μl)			10
Distilled Water (μl)	10		
Reagent (μl)	1000	1000	1000

The tubes mixed and incubated at 37°C for 5 minute and the absorbance of the standard and test were read at 500nm against the blank.

Serum TG (mg/dl) = $\frac{\text{absorbance of test} \times \text{Conc. Of standard}}{\text{Absorbance of standard}}$

ESTIMATION OF SERUM LDL-C

This was calculated using friedewald formula (friedewald *et al.*, 1972).

LDL-C (mg/dl) = $\frac{\text{TC} - (\text{HDL-C}) - \frac{\text{TG}}{5}}$

ATHEROGENIC INDEX

This was calculated using the formula below

$\frac{\text{TC} - \text{HDL-C}}{\text{LDL-C}}$

RESULTS AND DISCUSSION

Table 1 present the mean values of lipid profile parameters assessed. There was no significance difference in total cholesterol between the group 1 (1000mg/kg), group 2 (2000mg/kg) and group 3 (3000mg/kg) and the control (p>0.05). A non significance decrease was also observed in TG of group 3 (3000mg/kg) when compared with the control. There was no significance difference in HDL-C when group 1 (1000mg/kg), group 2 (2000mg/kg) and group 3 (3000mg/kg) were compared with the control. A non significance decrease was seen in LDL-C between that of group 1 (1000mg/kg) and that of group 3 (3000mg/kg). However, a non significant difference in VLDL-C and AI were observed between control and group 1 (1000mg/kg), group 2 (2000mg/kg) and group 3 (3000mg/kg) (p>0.05).

TABLE 1: Effects of date palm administration on lipids profile

	TC (mg/dl)	TG(mg/dl)	HDL(mg/dl)	LDL(mg/dl)	VLDL(mg/dl)	AI(mg/dl)
Control	91.33±26.76	95.67±23.87	42.33±24.37	27.33±3.21	19.13±4.84	1.8±0.2
Group 1	97.7±4.04	87.00±6.12	50.00±11.06	30.00±15	17.4±1.00	1.67±0.39
Group 2	95.67±7.05	94.00±16.6	50.33±11.93	26.67±18.58	18.8±3.33	1.9±0.53
Group 3	91.00±17.08	75.00±25.24	57.00±20.10	18.00±8.4	15.00±5.05	2.27±1.34

The data is expressed in form of mean ± standard deviation (n=4).Control group, group 1- 1000mg/kg, group 2- 2000mg/kg of body weight, group 3- 3000mg/kg body weight.

In this study, statistical analysis did not reveal any significance difference among the lipid profile parameters. Increased HDL-C was observed with group 1 (1000mg/kg), group 2 (2000mg/kg) and group 3 (3000mg/kg), although increase was not significance, which is comparable with the result of Hencheri *et al.*, (2013) who reported the absence of significant change in HDL-C and triglyceride which coincide with the finding of these research. It still might be beneficial for cardiovascular diseases. Studies have demonstrated that high level of HDL is associated with a lower incidence of cardiovascular disease (Assmann and Nofer, 2003).

Bhathena *et al.*, (2002) reported that LDL-C reduced significantly, which contrast with this finding which might be because of the variety of date palm used. The reduced LDL might still have effect on cardiovascular health. Moreover, Rock *et al.*, (2009) also reported that after 4 weeks of date palm consumption, the VLDL-C reduced by 8-15%.

It is well known that fibre is able to decrease LDL-C concentration by interrupting cholesterol and bile acid absorption and increasing LDL receptor activity. Dietary fibre has been reported to interfere with cholesterol absorption and enterohepatic bile circulation and to cause depletion of hepatic cholesterol pool (Lecumberri *et al.*, 2007).

The finding of these study suggested that date palm could have a protective effect against hyperlipidemia through improvement of lipid profile (Abuelgassim, 2010).

CONCLUSION

The lipid-lowering effect observed in dates palm extract (though not significant) might be due to its dietary fibre content. The result also suggests that date palm could have a protective effect against hyperlipidemia through improvement of lipid profile.

REFERENCE

- [1] Abuelgassim, A.O (2010). Effects of Flax seed and date palm leaves extract on serum concentration of glucose and lipids in alloxan diabetic rats. *Journal of Biological Science*. 13: 1141-5.
- [2] Al-shahib, W. And marshal, R.J. (1993). The Fruit of the date palm its possible use as best food for the future, *international journal of food sciences and nutrition*; 54:247-257
- [3] Assmann, G. and Nofer, J. (2003). Athero protective effects of High density lipoproteins. *Journal of medical Sciences* 54: 321-341
- [4] Allantain, C.C., Poon, L.S., Chan, C.S.G., Richmond, W.A. and FU, P.C (1974): Enzymatic determination of total serum cholesterol. *Clinical chemistry*; 20:40
- [5] Bhathena, S.J., A.A. Ali, A.I. Mohammed, C.T Hansen, M.T. Velasquez (2002). Differential effects of dietary flaxseed protein on plasma triglyceride and uric acid levels in animals models. *Journal of Nutritional Biochemistry*; 13: 684-689
- [6] Freidewald, W.T., Levy R.I. and Freidrickson, D.S (1972): Estimation of LDL-C in plasma without the use of the preparative ultra centrifugation. *Clinical chemistry* 18(6): 499-502
- [7] Hencheri cherifa, Stanhope KL., Havel PJ., Al-mawy M (2013). Study of the effect of dates on blood glucose and lipid profile in healthy subjects. *Journal of Pharmaceutical, Chemical and Biological Sciences*. 33: 826-833
- [8] Hilda S.D.M (1987): the date palm. Pp 376-380
- [9] Janick, Robert, W., and Vernon., WR (1974) An introduction to world crops W.H Freeman and Company, 2:489-490
- [10] Lorke, D. (1983). A new approach to acute toxicity testing. *Arch. Toxicol.* 54:275-287
- [11] Lecumberri, E., L, Mateos, R., Alia, M., Ramos, S. Izquierdo-pulido, Bravo, L. (2007). A diet rich in dietary fibre from cocoa improves lipid profile and reduces malodialdehyde in hypercholesterolemia rats. *Journal of Nutritional Biochemistry*, 23: 332-341
- [12] Mahran GH, Abdel-wahab SM, Attia AM. (1976). *Plant medicine*. 29(2): 171-5
- [13] Rock, W., Rosenbelt, M. and Boro chov-Neori, H. (2009). Effect of date consumption by healthy subjects on serum glucose and lipid levels and on serum oxidative status. *Journal of Agric Food Chemistry*. 57: 8010-7.