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PROTECTIVE EFFECT OF SOME FERMENTED DAIRY PRODUCTS ENRICHED WITH DIBS ON TOTAL POLAR COMPOUNDS FORMED DURING DEEP – FAT – FRYING PART I: ON BIOLOGICAL EXAMINATION OF RATS

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ABSTRACT

During deep fat frying , oils is exposed to elevated temperatures above 180^{0}C during intermittent frying for 40 hrs at 5 consecutive days. Toxicity of used oil for deep frying was related to its content of total polar compounds (TPC), caused abnormal changes in weaned rats. Ultimately, nutrition quality of the oil can be affected. The chemical assessment of date flesh, dibs, yoghurt, yoghurt and biogarde enriched with 5% dibs showed significantly ($P<0.05$) differences in all previous samples. Dibs samples recorded the highest amount of total sugars, reducing sugars, dietary fibers, total phenolics and minerals .It was interest to notice that using of dibs in the manufacture of yoghurt and biogarde (enriched with 5%) on the experimental rats groups . The objective of this study, were to investigate the influences of date palm syrup, plain yoghurt, yoghurt and biogarde enriched with 5% dibs on total polar compounds formed during deep frying of cotton seed oil on biological evaluation of experimental rats. The control group fed on non fried oil, the second rats control had fed fried oil containing over 25% TPC for 28 days. The second rats control group were divided into four groups (n=10), and were fed for 28 days on date syrup (dibs), plain yoghurt, yoghurt and biogarde fortified with 5% dibs.

Oral administration of TPC caused hepatotoxicity as monitored by increase in both of glutamic oxaloacetic transaminase (GOT) and glutamic pyruvic transaminase (GPT) enzymes, Compared with first control rats group, and fermented dairy products groups. Also, caused abnormal changes in kidney functionality compared with first control rats group. Particularly, total lipids, triglycerides, phospholipids, cholesterol and LDL cholesterol were found increased by TPC, while glucose was reduced significantly compared with the fermented dairy products supplemented with 5% dibs groups. Therefore, it could be recommended that the nutritional products enriched with dibs provides several therapeutic benefits including reduction of cholesterol, LDL cholesterol and protective effect of liver and kidney cells.

Keywords : Frying oils , Total polar compounds , yoghurt , Dibs , Biological examination .

INTRODUCTION

During intermittent deep- fat - frying , oils is exposed to elevated high temperature in the presence of air and moistures . A number of chemical reactions, occur during this time, as do change due to thermal decomposition. The rate of decomposition depends on the composition of oil, temperature and frying periods. (Carthew *et al*, 2001) . These reaction results change in fatty acid composition and cause a rapid deterioration of the frying oil (Jaswir *et al*, (2000) and EL- Naggar., 2011). Intermittent heating and cooling of

cotton seed oil showed that when oil heated for 62 hrs for several intervals , it contains as much total polar compounds TPCs as oil heated continuously for 166 hrs (Hassan and Abou – Arab , 2004) . TPC of fresh oil was 6.5% and amounted to 28% after 11 hrs of frying at 195 ^{0}C (Dimitra *et al*., 2002) .

Several studies indicated that products generated through oil oxidation can mutagenic and carcinogenic . (Ammouche *et al*., 2002) . Toxicity of oil used for deep fat frying was related to its content of dimeric and polymeric triglycerides, rather than to oxidized fatty acids , caused pathological changes in weaned rats includes growth retardation , impaired of liver function , enlargement of liver and kidneys when given at level of 20% in the feed for 14 days and fibrotic degenerative areas with severe vacuolization (EL – Hassaneen and Shaheen 1998., kotwal *et al* 1993., Quieles *et al* ., 2002 and El – Naggar 2007) .

The date palm (Phoenix dactylifera L.) are rich in certain nutrient and provide a good source of rapid energy due to their high carbohydrate (~ 70 – 80%) (Al – Farsi *et al*, 2007 and Gad *et al* ., 2010) . The good nutritional value of dates also based on their dietary fiber and on their essential minerals such as Ca Fe , Mn , P , K , Zn , Se and Mg (Gad *et al*., 2010, and EL – Naggar and Abd El – Tawab, 2012) .

Researchers found that consumption of dates might be of benefit in glycaemic and control of diabetic patients (Miller *et al*., 2003 and Gad *et al* ., 2010) . Another studies have indicate the aqueous extracts of dates have potent antioxidants and antimagnetic activity (Al – Farsi *et al* ., 2005) . The date fruit is listed in folk remedies for the treatment of various infectious diseases and cancer(Saaffi *et al*.,2011) . The antioxidants activity is attributed to the wide range phenolic compounds in dates including ρ-coumaric, ferulic , and sinapic acids, flavonoids and procyanidins (Al- farsi *et al* ., 2005). And also, the presence of vitamin C (Al-Laith 2007 and mansouri *et al*., 2005) . Quieles *et al* ; (2002) reported that TPC enriched diets would affect liver functionality in the presence of high levels of linoleic acid (n – 6) due to the LDL production , increased membrane permeability of the hepatocyte and the release of its from liver cells into the serum . However, there are a number of inconsistencies in non published date for example, excessive amounts of a very high omega – 6 / omega – 3 ratio promote the pathogenesis of many diseases. whereas increased levels of omega – 3 (a lower omega – 6 / omega – 3 ratio) , exert suppressive effects , and is more desirable in reducing the risk of many the chronic disease . Furthermore , repaired systems depended on trace elements , balanced ratio of omega – 6 : omega – 3 essential fatty acids , dietary fiber and antioxidants (Sanchez – Muniz *et al* ; 1998 and Simopoulos 2004)

The aims of this study were (1) to evaluate the effect of consuming altered cotton seed oil which containing over 25% TPC on experimental rats. (2) and to study the effect of date palm syrup (dibs) , plain yoghourt , yoghourt fortified with 5% dibs and biogarde fortified with 5% dibs on the experimental rats groups .

MATERIALS AND METHODS

Materials :

Saidy variety of date Phoenix dactylifera L. were used to preparate the date syrup (dibs) in this investigation . It was obtained from kharja Date Packing Factory during the sorting operations of the high quality fruits .

Chemicals :

All chemicals and solvents were obtained from El-Gomhoria Company, Assiut Governorate, Egypt.

Milk :

Fresh whole buffalo's milk was obtained from the herd of experimental farm, Faculty of Agriculture, Al – Azhar University , Assiut Branch .

Starter Cultures :

Bifidobacterium bifidum ATCC 15696, Lactobacillus delbruekii subsp . bulgaricus EMCC 11102, Lb . acidophilus ATCC 4356 and Streptococcus thermophilus EMCC 11044 were secured from Cairo MIRCEN , Ain Shams University .

Date syrup production (dibs) :

Date flesh was pitted , crushed and cut to small pieces with sharp Knife and dry – blended for 3 min . with a blender , and extracted twice using flesh powder / water rate 1:2 at 70 ^{0}C for 30 min , by using microwave oven . The raw syrup was collected separately and centrifuged at 4000 rpm for 15 min . and filtered through a Whatman no . 41 filter paper and concentrated in microwave to about 72 Brix .as described by El- Naggar and Abd El-Tawab, (2012). The produced date syrup (dibs) packed in sealed glass bottles and stored in the freezer until use .

Fermented dairy products preparation :

Fermented milks (plain yoghurt) were prepared as mentioned by Tawfik *et al*.,(2003) and Abd EL Tawab (2009) with some modifications .

The fresh standardized buffalo's milk (3.0% fat) was heated to 90 ^{0}C/ 15 min , then concentrated date syrup (dibs) was added at level 5% at 50 ^{0}C, (Ramadan, 1998; and El-Naggar and Abd El-Tawab, 2012), rapidly cooled to 42 ^{0}C., divided into two equal portions and each portion was separately inoculated with starter cultures as follow: Zabady: inoculated with 2% active growing culture (mixed 1:1 Str . thermophilus EMCC 1104 and Lb . delbruekii subsp . bulgaricus EMCC 11102) , according to Tawfik *et al*., 2003) . While , Biogarde used 6% active starter cultures of B. bifidum ATCC 15696 , Lb acidophilus ATCC 4356 and Str . thermophilus EMCC 1104 (2: 1 : 2) , as described by klupsch (1985) .

Frying process:

In frying process, about 2.5 kg of cotton seed oil was heated in stainless steel vessels at 180 ^{0}C $\pm$ 5. The potatoes were fried at regular intervals over a 8 hrs period each day for five consecutive days . Oil samples were taken after reach over 25% TPC (El-Naggar, 2007).

Proximate analysis :

Total solids, protein, total sugars, reducing sugars were determined according to AOAC (2003).

Non–reducing sugars were calculated by difference, as follow:

% Non-reducing sugars = Total sugars – reducing sugars

Total polar compounds (TPC) were determined by Takeoka *et al*., (1997) . Dietary fibers was carried out according to (Al Farsi *et al*., 2007) Total phenolics were determined colorimetrically as described by (Al Farsi *et al*., 2005) . Minerals i.e. Na., K, Ca, Fe and Zink were estimated according to AOAC (2003) using absorption spectrophotometer (perkin – Elmer Instrument Model 2380, USA) . Hydroxymethylfurfural (HMF), titratable acidity (T . A), pH, total soluble solids (T. S. S) fat content were determined in dibs and fermented dairy products according to Rangana (1986) and Ling (1963).

Biological evaluation :

Table (i) : Composition of basal diets (gm / 100 gm) according to El-Naggar, 2007

Ingredients	Weight
Casein	15
Cotton seed oil	15
Sucrose	22
Maize starch	43
Salt mixture	4
Vitamin mixture	1

Experimental design :

Eighty eight adult male albino rats, weighting 75 ± 5g. were obtained from the animal house, Faculty of Mmedicine, Assiut University. The rats had been fed a commercial non-purified diet, after adaptation period of four days to the new environmental conditions. The rats were divided into main two groups and individual housed in plastic metabolic cages in a temperature controlled room (25ºC with a 12 hrs Light-dark cycle). The main two groups divided as follow:

G1 : Rats fed on basal diet (Negative Control).

G2 : Rats fed on basal diet + Fried oil containing 25% TPC (Positive Control) for 28 days. The positive control group was randomly divided into four groups of ten rats each, as follow:

G3 : Rats fed on basal diet + Dibs (8ml/ Kg).

G4 : Rats fed on basal diet + Plain yoghurt (8ml/ Kg).

G5 : Rats fed on basal diet + Yoghurt enriched with 5% dibs (8ml/ Kg).

G6 : Rats fed on basal diet + Biogarde enriched with 5% dibs (8ml/ Kg).

Food intake was checked every day , body weight variation were measured every two days . Blood samples were collected in fasting conditions by killed under mild anaesthesia and the organs were collected (liver and kidney) . The blood was allowed to clot and the serum was stored in deep – freeze for further analysis .

Biochemical analysis :

Glutamic pyruvic transaminase (GPT) and glutamic oxaloacetic transaminase (GOT) activities in rat serum were measured according to

Reitman and Frankel , (1957) . Blood urea and uric acid were measured according to Patton and Crouch (1977) . Creatinine content in rat serum was determined according to the method described by Owen *et al* ., (1954) ., glucose by Trinder (1969) ., total cholesterol by Lopes – Virella *et al*., (1977) ., LDL – cholesterol by Friedwald *et al* ., (1972) as follows :

$$\text{LDL – cholesterol (mg / dl)} = \text{total cholesterol} - \left(\text{HDL} + \frac{\text{Triglyceride}}{5}\right)$$

Triglyceride and phospholipids in rat serum were estimated according to the method described by Uwajma *et al* ., (1984) . Serum total lipids were determined according to the method described by Frings and Dunn , (1970) . Organ weight analysis biological evaluation were recorded as described by Carthew *et al* ., (2001) .

Statistical analysis :

The data were subjected to statistical analysis using the method of student “t” test (Statistical Graphics Crop, 1998). Significant differences were determined at the P≤0.05 level.

RESULTS AND DISCUSSION

Chemical composition of date flesh , date palm syrup (dibs) , plain yoghurt, yoghurt enriched with 5% dibs and biogarde enriched with 5% dibs :

It was evident from the data obtained in Table (1), that fresh samples showed significant ($P < 0.05$) differences in their contents of chemical analysis in all treatments.

As seen in the same data, date flesh samples recorded the highest values of total solids, total sugars, reducing sugars, dietary fibers, total phenolics, titratable acidity, ash, Na, K and Mg . The higher in total solids was related to the date contain a high percentage of carbohydrate (Gad *et al*., 2010) . Data presented in this study demonstrated that date flash samples were no contain of HMF . Total dietary fibers content in date flesh was 8.76% . Date flesh was to be good sources of dietary fibers . Similar results are found with other types of date (El – Shaarawy *et al* ., 1986 and Al – Farsi *et al* ., 2007) . In contrast , dibs attained the content of dietary fibers, being 0.35% followed by yoghurt and biogarde enriched by 5% dibs, and plain yoghurt no contain dietary fibers (Table 1) .

Date flesh samples had the highest amount of total phenolics followed by dibs, and then biogarde and yoghurt supplemented with 5% dibs . In this connection , Mansouri *et al*. (2005) , illustrated that the predominant phenolics found in date fruits are very active as antioxidants and the antiradical activity in dates was highly correlated to the phenolic contents . However , the presence of the antioxidant activity of the yoghurt enriched with 5% dibs was attributed to the presence of phenolics compounds (Gad *et al* ., 2010) .

On the other hand, it can be seen that plain yoghurt had the lowest content of total solids, total sugars, reducing sugars , non – reducing sugars , total phenolic compounds , titratable acidity , ash , Na , K , Mg and Fe as compared with other samples, while dietary fibers and HMF were absent .

Means value for pH and titratable acidity of yoghurt and biogarde containing 5% dibs are presented in Table (1) . Yoghurt and biogarde enriched with 5% dibs had near acidity and pH values of plain yoghurt . However , El – Naggar and Abd El – Tawab (2012) gave similar figures for T.A. and pH in fresh yoghurt and biogarde enriched with 2% dibs .Addition of dibs had no effect on fat and protein contents , while increased the total solids of the yoghurt and biogarde . These results are in accordance with Gad *et al*., 2010.

Additionally , it was clear from data obtained in Table (1), the minerals content of the yoghurt and biogarde – 5% dibs were higher than the plain yoghurt . Dates could have an important to play in dietary health , supplemented with dibs is very possibility that they contain other components that may have useful functional foods .

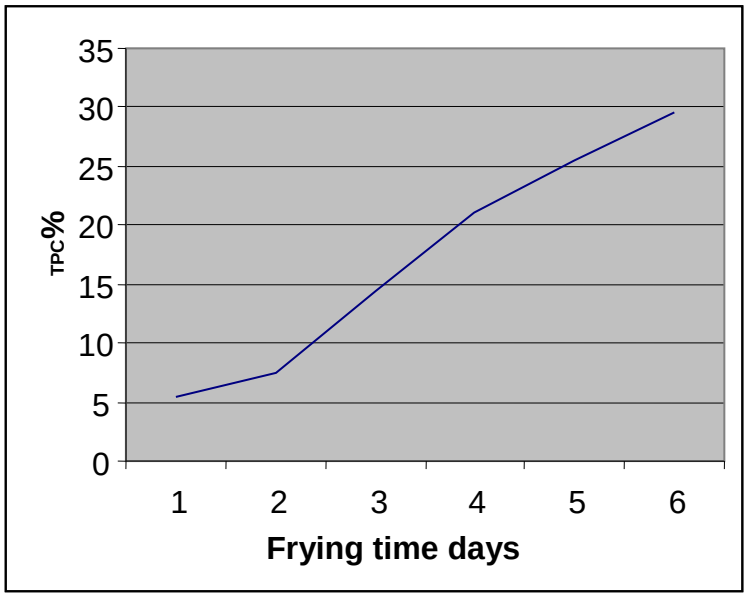

Fig. l : Total polar compounds in cotton seed oil during intermittent frying of potato chips for 40 hrs at 5 consecutive days (8 hrs daily).

Total polar components (TPC) is a representative measurement of the total alteration of the oil . In fried oil , there are breakdown products as a result of the frying process . For this reason it is generally considered as a good index of the alterations caused by deep fat frying . TPC is a basis for the assessment of the end point of frying we chose 25% TPC which is the regulatory limit in many European countries . (El – Naggar , 2007) . TPC increased in initial experimental after frying process for different period times .

Effect of feeding diets containing date palm syrup (dibs), plain yoghurt, enriched with 5% dibs and biogarde enriched with 5% dibs for 28 days on growth parameters of rats:

Such result lead us to hypothesize that the intake of these fried oils (over 25% TPC) could differentially affect several aspects of adverse effects . Thus , we fed rats for 28 days with the non fried or the 40 hrs fried oils to study biological changes .

The rats were fed semi – synthetic diets containing either 15% cotton seed oil with over 25% TPC or 15% non fried cotton seed oil (control) with 5.5 % TPC.

Therefore, the effect of fed rats on the diets containing fried cotton seed oil , date palm syrup (dips) and products which produced from it , on some the most important parameters including liver and kidney functionalities , total lipid , total cholesterol , LDL and HDL – cholesterols and glucose , beside both of food intake , body weight gain , food efficiency and internal organs weights .

From the obtained results of Table (2) , it could be observed that the mean body weight gain of rats fed fried oil over 25% TPC was 67.30 gm against 107.84 (G2) in control rats group (G1).

Treatment of TPC – treated rats by date palm syrup , plain yoghurt , yoghurt fortified with 5% dibs and biogarde fortified with 5% dibs tends to food intake , body weight gain and food efficiency which were (8.9 , 88.5 and 0.355) (G3) ; (8.95 , 93.5 and 0.373) (G4) ; (9 , 94.73 and 0.375) (G5) and (9.25 , 102 and 0.393) (G6) respectively , when compared with second control (7.5 , 67.3 and 0.320) (G2) . Also , results showed that oral administration of TPC (second control) (G2) , significantly decreased with those of the first control group ($p< 0.05$) (G1) . But no significant ($P> 0.05$) changes were observed between G3 and G4 at the end of the experimental period . Many of researchers reported that almost all amino acids react with primary and secondary products of fried oils , thereby decreasing the digestive utilization of protein , fats which may affect weight gain , food intake and food efficiency (Lopez – varela *et al*; (1995) AL – Shahib and Marshall (2003), Contrarily, Saaffi *et al* ., (2011) indicated that the presence of date palm syrup in food is desirable because nutritional value increases with the remaining of unsaturated fatty acids and other essential food constituents .

Table (1) : Chemical composition of date flesh , date palm syrup (dibs) , plain yoghurt, yoghurt enriched with 5% dibs and biogarde enriched with 5% dibs (mg/100gm fresh weight basis):

Treatments / Components	Date flesh	Date palm Syrup (dibs)	Plain Yoghurt	Yoghurt Enriched with 5% dibs	Biogarde enriched with 5% dibs	**** L. S. D. at 0.05
Total solids%	89.49 ± 5	81.00±6	13.14±3	13.40±4	13.36±4	8.40
Protein %	1.78±0.5	1.70±0.3	4.14±0.4	4.41±0.5	4.27±0.3	0.07
Fat %	2.10±0.2	2.42±0.4	2.90±0.3	3.10±0.4	3.00±0.5	0.30
Total sugars%	77.70±4	71.35±3	4.52±2	4.80±1	4.74±2	6.30
Reducing sugars %	75.20±3	67.85±5	4.26±2	4.56±2	4.52±1	7.30
Non- reducing sugars %	2.50±0.5	3.50±0.4	0.22±0.5	0.24±0.4	0.25±0.3	0.98
Dietary fibers %	8.76±3	0.35±0.1	0.00	0.02±0.01	0.03±0.01	8.40
Total phenolics * mg/100gm	190.00±10	173.00±9	0.00	8.55±5	9.57±4	16
Hydroxymethylfurfural ** mg/100gm	0.00	30.00±7	0.00	0.52±0.09	0.50±0.05	29
P H	6.00±0.5	6.52±0.4	4.81±0.1	4.76±0.2	4.69±0.3	0.55
Titratable acidity ***	5.90±1	3.75±2	0.80±0.08	0.93±0.07	0.97±0.05	2.3
Ash %	1.90±0.7	1.84±0.03	0.77±0.01	0.85±0.02	0.96±0.04	0.05
Na mg / 100 g	90.0±3	87.0±4	55.3±4	65.4±5	63.1±6	3
Ca mg / 100 g	28.0±6	27.0±7	150.1±5	155.8±7	157.1±8	17
K mg / 100 g	1000±10	980±11	204±9	209±12	211±13	25
Mg mg / 100 g	52.0±2	50.0±4	18.3±5	20.4±4	23.1±3	5
Fe mg / 100 g	10.00±1	9.80±2	0.52±.0.03	1.12±0.5	0.87±0.04	2
Zinc mg / 100 g	0.90±0.05	0.91±0.03	4.00±0.5	6.03±1	5.34±0.4	1

*** Data are expressed as milligram of gallic acid equivalents (GA) per 100 g on a fresh weight basis.**

**** Data are expressed as milligram per 100 g of fresh weight.**

***** Data of titratable acidity in date flesh and date palm syrup are expressed as percent of acetic acid, but in plain yoghurt, yoghurt and biogarde enriched with 5% dibs are expressed as lactic acid.**

Each value represents the mean ± S.D

****** Significant differences were calculated at the P ≤ 0.05.**

Concerning change in internal organs weight . Results showed a significantly (P < 0.01) increased mean absolute liver and kidney weights for all groups compared with second control rats group . on contrast , results showed decreased mean relative liver and kidney weights . These observation owing to the increased final body weight (Billek 2000) .

Table (2) . Effect of feeding diets containing date palm syrup (dibs), plain yoghurt, enriched with 5% dibs and biogarde enriched with 5% dibs for 28 days on growth parameters of rats:

Treatment / Biological Parameters	Non fried oil 5.5% TPC Negative control (G1)	Fried oil over 25% TPC Positive control (G2)	Date syrup (Dibs) (G3)	Plain yoghurt (G4)	Yoghurt with 5% dibs (G5)	Biogarde with 5% dibs (G6)	** L. S. D. at 0.05
Initial body weight (gm)	70.66± 2.60	76.30± 4.60	144.3± 2.30	144.5± 2.5	140.35± 2.15	141.25± 1.95	5.6
Final body weight (gm)	178.5± 5.5	143.6± 6.5	231.8± 5.45	238± 4.80	235.08± 5.2	243.25± 4	33.9
Food intake (g/day)	9.50± 0.30	7.50± 0.85	8.9± 0.15	8.95± 0.25	9.00± 0.35	9.25± 0.45	1.75
Body weight gain (gm)	107.84± 5.7	67.30 ± 4.4	88.50 ± 4.85	93.50 ± 5.21	94.73 ± 3.95	102± 5.7	20.2
Rate of growth (g/day)	3.851 ± 0.50	2.403 ± 0.25	3.160 ± 0.39	3.339 ± 0.41	3.383 ± 0.51	3.642 ± 0.38	0.75
Food efficiency	0.405 ± 0.02	0.320 ± 0.03	0.355 ± 0.03	0.373 ± 0.02	0.375 ± 0.01	0.393 ± 0.03	0.035
Liver (gm)	2.69± 0.52	1.93± 0.035	2.65± 0.41	2.68± 0.41	2.7± 0.35	2.75± 0.4	0.72
R *	1.507	1.344	1.143	1.126	1.148	1.130	___
Kidney (gm)	0.72± 0.1	0.71± 0.03	0.80± 0.20	0.85± 0.15	0.99± 0.25	0.95± 0.35	0.01
R *	0.403	0.494	0.345	0.357	0.421	0.390	___

Each value represents the mean ± S.D. of ten rats.
R* = relative organ weight (in g/100 g body weight).
**** Significant differences were calculated at the P ≤ 0.05.**

Effect of feeding diets containing date palm syrup (dibs), plain yoghurt, enriched with 5% dibs and biogarde enriched with 5% dibs for 28 days on biological parameters of rats:

As well known, both of glutamate oxaloacetate transferase (GOT) and glutamate pyruvate transferase GPT were selected and tested as markers of liver and heart functionalities (EL–Naggar, 2007) . Table (3) showed the serum hepatic marker enzyme levels of control and experimental rats . Oral administration of TPC caused abnormal liver function in treated rats . The (GOT) and GPT were significantly increased ($p< 0.05$) in TPC treated rats , when compared with first control rats group . Treatments with date palm syrup (dibs) ; plain yoghurt ; yoghurt fortified with 5% dibs and biogarde fortified with 5% dibs significantly ($p < 0.05$) repaired liver function enzymes when compared with TPC treated rats . Therefore , the abnormal parameters observed in TPC treated group may be a result of the combination of cholinergic and oxidative stress. TPC – induced oxygen radical with an augmented lipid peroxidation index as made evident by the significant increase in GOT and GOT detected in the liver . (Saaffi *et al* ;

2011) . In contrast, the protective action of antioxidant may be due to an inhibition of reactive oxygen species . (Biglari *et al* ; 2008) .

Table (3): Effect of feeding diets containing date palm syrup (dibs), plain yoghurt, enriched with 5% dibs and biogarde enriched with 5% dibs for 28 days on biological parameters of rats :

Treatment / Biological Parameters	Non fried oil 5.5% TPC G1	Fried oil over 25% TPC G2	Date syrup (dibs) G3	Plain yoghurt G4	Yoghurt with 5% dibs G5	biogarde with 5% dibs G6	* L. S. D. at 0.05
GOT (Units/L.)	36.1± 1.55	66.5± 1.75	30.2± 1.60	37.5± 1.75	32.75± 1.8	30.75± 1.85	28
GOT (Units/L.)	25.4± 1.75	48.0± 1.75	23.4± 1.54	28.15± 1.60	25.65± 1.65	22.80± 1.75	18.86
Total cholesterol (mg/dl)	118.5± 1.9	163± 2	114.2± 1.83	120.10± 1.95	117.40± 2.10	110.85± 2.30	42.5
LDL – cholesterol (mg/dl)	75.10± 0.02	117.9± 0.015	70.25± 0.12	82.34± 0.29	80.15± 0.30	75.45± 0.41	35.35
HDL – cholesterol (mg/dl)	25.25± 2.2	26.8± 1.90	23.49± 2.40	27.50± 2.50	28.24± 2.74	28.5± 2.84	0.70
Total lipids (mg/dl)	350.3± 0.2	452± 0.31	320.4± 0.39	350.5± 0.95	340.4± 1.5	340± 1.45	101
Triglyceride (mg/dl)	99.5± 2.50	105.5± 1.24	95± 2.73	98± 2.95	93.40± 3	90.50± 2.80	5.96
Phospholipids (mg/dl)	100± 1.70	135± 1.65	92± 0.95	100.2± 0.99	95.34± 1.50	93.40± 1.82	34.6
Blood urea (mg/dl)	22.5± 1075	30.5± 1.85	20± 1.15	23.40± 1.2	22.15± 1.55	21.70± 1.65	6.99
Uric acid (mg/dl)	3± 0.03	4.7± 0.04	2.7± 1.53	3.00± 1.75	2.85± 1.80	2.80± 1.90	1.65
Creatinine (mg/dl)	0.30± 0.02	0.73± 0.03	0.25± 0.01	0.55± 0.05	0.40± 0.07	0.32± 0.09	0.17
Glucose (mg/dl)	98± 106	140± 1.5	99± 1	95± 1.2	91± 1.4	88.0± 1.34	40

Each value represents the mean ± S. D. of Five rats.
*** Significant differences were calculated at the P ≤ 0.05.**

Table (3) showed that the serum total cholesterol level of control group and experimental rats . Oral administration of fried cottonseed oil caused markedly increased in TPC treated rats . Also , results showed that oral administration of TPC (second control rats group) (G2) , significantly ($p< 0.05$) increased with those of first control rats group , and the other groups .The LDL cholesterol is the major vehicle cholesterol transport in rat serum. The LDL and HDL – cholesterols were exhibited the same trend . Noteworthy , the slight increased in HDL – cholesterol dose not parallel to increased in LDL – cholesterol . Total cholesterol and LDL – cholesterol were significantly ($p< 0.05$) increased in TPC treated rats group compared with

first control rats group (G1). Treatments with date palm syrup, plain yoghurt , yoghurt fortified with 5% dibs and biogarde fortified with 5% dibs greatly decreased the rat of LDL c/HDL cholesterols and significantly ($p < 0.05$) repaired these parameters when compared with TPC treated rats group . Our group further found that rats fed fried oil with 28% TPC exhibited higher total cholesterol and LDL – cholesterol levels than their respective controls . While , diets contained the antioxidant exhibited lower total cholesterol and LDL – cholesterol levels than their respective controls (Polonio *et al* ; 2004) . TPC formed during thermal treatments are associated with an increase the risk of the coronary heart diseases (CHD) caused by high cholesterol levels and oxidation the LDL – cholesterol (Abd – EL – Ghany , 2006) .The diminishing serum cholesterol concentration in TPC – treated rats group by date palm syrup , plain yoghurt , yoghurt fortified with 5% dibs and biogarde fortified with 5% dibs can be due to a reduction in cholesterol biosynthesis in the liver resulting in the decrease in the biosynthesis and secretion of hepatic LDL (Ammouche *et al* ; 2002) . It should also be noted that total phenolics act as a powerful antioxidant on biologic hydrophobic compartments and represents an important antioxidant in serum. Therefore , this total phenolics should have intervened in the detoxification process . (Ammouche *et al* ; (2002) and Saafi *et al* ; 2011) . Gad *et al* ; (2010) concluded that, in many ways , date palm and its derivatives may be considered as an almost ideal food , providing a wide range of essential nutrients and potential health benefits in lipid control , antioxidant and antimutagenic properties.

Results in Table (3) showed that serum kidneic marker level of control and experiment rats. Oral administration fried oil caused abnormal kidney function in TPC treated rats group. Creatinine , blood urea and uric acid are most frequently measured for diagnosis of kidney diseases. Concentration of creatinine, blood urea and uric acid were significantly increased ($P<0.05$) in TPC treated rats group, compared with first control rats group. Treatments with date palm syrup, plain yoghurt, yoghurt and biogarde fortified with 5 % dibs significantly ($P<0.05$) restored these parameters when compared with TPC treated rats group.

Generally, biogarde and yoghurt enriched with 5 % dibs have some major minerals providing a wide range of potential health benefits, potassium is stimulating the kidney to expel toxic bodily wastes (Gad *et al*., 2010).From the obtained results of table (3), it could be observed that the mean of serum glucose of TPC treated rats group (G2) was 140 against 98 (mg/dl) in first control rats group (G1). Treatment of TPC- treated rats by date palm syrup (G3), plain yoghurt (G4), yoghurt enriched with 5% dibs (G5) and biogarde enriched with 5 % dibs (G6) tends to serum glucose which were (99), (95), (91) and (88 mg/dl) respectively. Therefore, consumption of date syrup or fermented dairy products enriched with 5 % dibs may also benefit in glycaemic of diabetic patients. Fermented dairy products (probiotics) are complex and metabolically active microorganisms. Thus, it is to be expected that they may influence the host health by several manners, including immune stimulation, competition for nutrients (mannitol and B- vitamin production) and/or production of antimicrobials. Our results are in agreement with similar data reported by (Miller *et al*., 2003 and Gad *et al*., 2010).As

shown in Table (3) illustrated the concentration of total lipids, phospholipids and triglycerides levels of control and experimental rats. Oral administration of fried oil caused progressively increased in TPC treated rats group (G2). The increase in total cholesterol and phospholipids contents reflecting the increase in the lipid of the experimental group. Concentration of total lipid, phospholipids and triglycerids were significantly increased ($P<0.05$) in TPC treated rats group (G1), compared with first control rats group (G2). Treatments with date palm syrup (G3), plain yoghurt (G4), yoghurt enriched with 5% dibs (G5) and biogarde fortified with 5 % dibs (G6) significantly ($P<0.05$) repaired these parameters when compared with TPC treated rats group (G1). These findings could be interpreted as the result of the inhibition effect of toxic compounds formed during deep fat- frying (TPC), resulting retardation and inhibition the enzymes activity responsible for lipids metabolism and biosynthesis (Ammouche *et al*., 2002).

Finally, biogarde and yoghurt enriched with 5 % date palm syrup (dibs) have some total phenolics. The phenolics found in date fruits are very active as anti- oxidant and antiradical activity (Saaffi *et al*., 2011). Our study showed that consumption of fermented milk products provides several therapeutic benefits including reduction of cholesterol and LDL- cholesterol concentration. This findings may be attributed to activity of hydroxymethylglutarate (may be inhibition of cholesterol biosynthesis) and metabolites produced during fermentation, resulting a deconjuation of bile salts (Zommara *et al*., 2006).The findings data including protective of liver and kidney cells from total polar compounds produced from deep- fat- frying. Our results are in agreement with similar data reported in different experimental models of rats exposed to pesticides and other chemical compounds (Saaffi *et al*., 2011).

The date palm syrup (dibs) and/ or fermented dairy products food we eat every day may not give us the required quantity of mineral, dietary fiber, carbohydrates and phenolics compounds, but to improve the nutrition of many people, restored of Kidney and liver functionalities. The chronic diseases appearing in experimental rats may be due to excessive consumption of high fried oil containing over 25% TPC. This diseases are beginning to appear to adopt similar lifestyles and eating habits. Therefore, date palm syrup and fermented milk products enriched with dibs could have an important all- round role to play in dietary health.

CONCLUSION

The obtained results showed a liver and kidney repairing effect of the dibs and/or fermented dairy products supplemented with 5% dibs accompanied with balanced of nutritional constituents and containing cultures of probiotics bacteria strains. Also, the fermented dairy products may enhance their health through modulating fried oil metabolism.

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التأثير الواقي لبعض منتجات الألبان المتخمرة المدعمة بالدبس على المركبات القطبية الكلية المتكونة أثناء القلى العميق
الجزء الأول: عن طريق الفحص البيولوجى للفئران

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أثناء القلى العميق، تتعرض الزيوت لدرجات حرارة فوق ١٨٠م أثناء القلى المتقطع لمدة ٤٠ ساعة وعلى مدار خمسة ايام متتالية، وتعزى سمية الزيوت الغذائية المستخدمة فى القلى العميق إلى إرتفاع محتواها من المواد القطبية الكلية المسببة للتغييرات غير الطبيعية فى مجموعات الفئران المعاملة. لذا فسوف تتأثر جودة الزيت الغذائية. وتم التقييم الكيماوى لعينات لب البلح الطازج، والدبس، واليوجورت السادة، واليوجورت المدعم بالدبس، والبيوجارد المدعم بالدبس. وتبين من النتائج إرتفاع محتوى عينات الدبس من السكريات الكلية، والسكريات المختزلة، والألياف الغذائية، والمواد الفينولية، والعناصر المعدنية.

وتهدف الدراسة لبحث تأثير كل من الدبس واليوجورت، واليوجورت المدعم بالدبس والبيوجارد المدعم بالدبس على مجموعات الفئران المغذاة على زيت قلى تجاوزت نسبة المواد القطبية الكلية به ٢٥% لمدة ٢٨ يوم، ثم قسمت هذه المجموعة إلى أربع مجموعات بواقع ١٠ فئران بكل مجموعة ولمدة ٢٨ يوم من خلال التغذية على الدبس واليوجورت السادة واليوجورت المدعم بالدبس، والبيوجارد المدعم بالدبس. وتبين من النتائج أن تناول الزيت المرتفع فى محتواه من المواد القطبية الكلية أدى إلى تسمم بالكبد نتيجة إرتفاع انزيمات GPT , GOT مقارنة بالكنترول، وبمجموعات منتجات الألبان المختمرة المدعمة بالدبس وغير المدعمة به. كما تبين حدوث تغييرات غير طبيعية بوظائف الكلى مقارنةً بالكنترول. كما تبين أيضاً زيادة كل من الليبيدات الكلية، الجليسريدات الثلاثية، الفوسفوليبيدات والكوليسترول الكلى والكوليسترول منخفض الكثافة مقارنة بالكنترول وبمجموعات منتجات الألبان المتخمرة المدعمة بالدبس وغير المدعمة به. بينما حدث إختزال بالجلوكوز مقارنة بمجموعات منتجات الألبان المتخمرة المدعمة بالدبس وغير المدعمة به.

وبناءً عليه يمكن التوصية بتداول منتجات الألبان المتخمرة المدعمة بالدبس لأهميتها العلاجية فى خفض الكوليسترول الكلى والكوليسترول منخفض الكثافة وفى وقاية خلايا الكبد والكلى.

قام بتحكيم البحث

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