Al-Azhar J. Agric. Res., Vol. 16 (Sebtmber) 2013, pp. 1-15

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

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ABSTRACT: Today's, fried oil consumption is a major factor increasing health risk. During the frying many reactions occurred. These reactions generate total polar compounds (TPC) and other decomposition products which responsible for several cell alterations in the organism. Recent studies have proved potent of nutritional antioxidants of dates to prevent the injury caused by TPC. In this work, we evaluate the role of date palm syrup(dibs), plain yoghurt, yoghurt supplemented with dibs and biogarde supplemented with dibs in protection against histopathological changes of kidney, liver and testis tissues induced by subchronic exposure to TPC. The fatty acids occur in both none, fried cottonseed oil and fermented dairy products enriched with dibs as a range of saturated and unsaturated acids were evaluated. Oral administration of TPC caused histopathological changes i.e. inflammation, congestion necrosis and hypertrophy in organism section. Treatment with date palm syrup and / or fermented dairy products supplemented with dibs restored both of liver, kidney and testis damage induced by TPC. There were considerable variations among rats groups in their fecal content of lactic acid bacteria, Bifidobacteria, *Str. thermophilus*, coliforms and staphylococci. The rats fed fermented dairy enriched with dibs resulted in higher fecal lactic acid and Bifidobacteria counts compared to control group. While fermented dairy products with bifidobacteria and / or lactic acid bacteria were inhibit the growth of staphylococci and coliforms.

INTRODUCTION

It is well established that heating of oil results in formation of compounds with antinuritional properties. These compounds may be enzyme inhibitor, vitamin destroyers, lipid-oxidation products gastro intestinal irritants and /or potential mutagens(Singh and Tyagi,2001;Karima Dhaouadi et al.,2011; and El-Nagger,2007). Food frying may be problematic due to lengthy exposure to extreme conditions. Both of a fraction of polar compounds and malonaldehyde separated from frying oils showed mutagenic activity (Saguy and Dana, 2003). Fed rats on heated groundnut oil exhibited normal histology, while heated mohua oil fed rats showed moderate hepatic hypertrophy with only one rat out of four exhibiting unilateral atrophic testicular damage(Kotwal et al.,1993; Carthew et al., 2001; and Michael et al;2012).

Evaluation of the effect of fried groundnut and mohua oils on experimental rats showed more damage to liver of rats, while the kidney of all rats fed either raw or used groundnut and mohua oils depicted normal histological picture. Several studies indicate that product generated through oil oxidation can be mutagenic and carcinogenic (El- Hassaneen and Shaheen, 1998 and Karima Dhaouadi et al.,2011).

The ingestion of high trans fatty acids, total polar compounds TPC or malonaldehyde containing diets caused a significant raise in the LDL cholesterol level with a highly significant reduction in HDL cholesterol level in blood.

Leading to appear the coronary heart disease (CHD) throughout the long life time, leading to exhibit the breast and colon cancer, the decreased efficiency ratio, growth retardation hypertrophy of liver and kidney and failure of liver function, i.e. persistent rise

serum glucose and LDL cholesterol and hyperactivity of their enzymes leading to decay their function the experimental animals, Sebadio and Chardigny, 1996; Abd El-Ghany,2006 and El-Naggar,2007 and Michael et al; 2012. Several studies demonstrated the beneficial health promoting effects of date palm syrup since dates contain a high percentage of carbohydrates, fat ,protein, salt, and minerals, vitamins and high percentage of dietary fiber(El-Naggar and Abd El-Tawab,2012).

The good nutritional values of dates is based on their dietary fibers, phenolics compounds and on their essential minerals such as Ca, Fe, Mg, P, K, Zn, Se and Mn (Saaffi et al., 2011and Ozdal et al.2013). Research proves that the aqueous extracts of dates(dibs) have potent antioxidant and antimutagenic activity (Ishurd and Kennedy, 2005; Mansouri et al.,2005 and Gad et al., 2010). Fermented dairy products were made with the use of mixed strain cultures of *Streptococcus thermophilus* and *Lactobacillus delbrueckii subsp. bulgaricus* (Zommara et al.,2006 and Karima Dhaouadi et al.,2011). Several studies showed that long term consumption of fermented dairy containing cultures of *Bifidobacterium* spp. provides several therapeutic benefits including prevention of cancer (Zommara et al., 2006 Gad et al., 2010 and). The good news is that consumption of dates may also benefit in glycaemic and lipid control of diabetic patients(Miller et al., 2003),reduction of LDL-cholesterol, glucose, GOT and GPT enzyme activity (Saaffi et al., 2011)and modulation of immune response (Zommara et al.,2006).Accordingly, we hypothesized that date palm syrup (dibs), plain yoghurt, yoghurt supplemented with 5% dibs and biograde supplemented with 5% dibs improved histopathological changes in rats induced by total polar compounds (TPC, formed during intermittent deep frying of cotton seed oil for 40 hrs at five consecutive days,8 hrs daily).

MATERIALS AND METHODS

Materials:

Saidy variety of date (*Phoenix dactylifera* L.) was used to prepare the date syrup 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 Sigma Aldrich Co. Ltd (Dorset, UK).

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 *Sterptococcus thermophilus* EMCC 11044 were secured from Cairo MIRCEN Ain Shams University.

Date syrup production:

Date flesh was pitted crushed and cut to small pieces with sharp knife and dry – blended for 3min with a blender, and extracted twice using flesh powder/water rate1:2 at 70C 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 1 filter paper and concentrated in microwave to about 72 Brix. The produced date syrup (dibs) packed in sealed glass bottles and stored in the freezer until use.

Fermented milks preparation:

Fermented milks were prepared as mentioned by Abd El-Tawab, 2009 with some modifications. The fresh standardized buffalos milk(3.0% fat) was heated to 90°C / 15 min. then concentrated date syrup (dibs) was added at level 5% at 50°C rapidly, cooled to 42°C., divided into two equal portions and each portion was separately inoculated with starter cultures as follow: yoghurt inoculated with 2% active growing cultures (mixed) *Str. thermophilus* EMCC 1104 and *Lb. delbruekii subsp. bulgaricus* EMCC 11102, according to Tawfik et al.(2003). While, biogarde; used 6% active starter culture of *B. bifidum* ATCC 115696 *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°C. ± 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 25% TPC.

Analytical methods:

Gas chromatographic analysis of fatty acids composition. The fatty acid composition of date palm syrup, plain yoghurt, yoghurt supplemented with 5% dibs and biogarde supplemented with 5% dibs were determined by gas chromatography as reported by Sanchez-Muniz et al. (1993), and the fatty acids methyl esters (FAME)dissolved in the hexane were dried over Na2 SO4/Na HCO3 (4:1,w/w), FAME samples were quantified using a Hewlett Packard gas chromatograph (5890 series) equipped with flame ionization detector. The chromatograph was fitted with FFAP 30 m X 0.32 mm X 0.25 μm capillary column coated with polyethylene glycol. The column oven temperature were programmed from 50°C to 240°C and finally kept at 240°C for 30 min. injector and detector temperature was 250°C and 260°C respectively. Gases flow rates were 33, 30 and 330 ml. / min. for N2, H2 and air, respectively, all peaks from C6 to C20 homologous series well defined. Peak identification was performed by comparison of the relative retentions time (RRT) for each peak with those of standard chromatograms the peak was measured by triangulation and the relative proportion of individual compound were therefore obtained by determination the partial areas in relation to total area.

Analytical methods:

composition of diets (gm /100 gm), according to El-Naggar, 2007, as follow: **Casein,15g,Cotton seed oil,15g,Sucrose,22g,Maize starch,43g**, Salt Mixture,**4g Vitamin** Mixture,1g.

Biological design:

Eighty eight adult male albino rats, weighting 75 ± 5g. were obtained from the animal house, Faculty of Medicine, 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 :(The first group contained 8 rats) Rats fed on basal diet (Negative Control).

G2 :(The second group contained of 80 rats) 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).

Blood samples were collected in fasting condition by killed under mild anesthesia and the organs were collected (liver, testis and kidney).

At the end of experimental period, 1 cm cuts of liver kidney and testis were subjected to hisltopathological examination after fixing in 10% neutral formalin. Fixed tissues were transferred through progressive ethanol and xylene grades, embedded in paraffin, section were cut (4 μm thick) and stained with eosin and haematoxlin (Carthew et al., 2001 and Saaffi et al., 2011),and examined microscopically.

Fecal bacterial populations:

Fecal samples for each rat group were collected at the end of experimental period(28 days)in a sterilized Petri dishes and 1.0g of feces was transferred to 99 ml saline solution . Serial dilutions of each sample were made in reproduced liquid casein yeast broth (2g casein hydrolysate; 2g yeast extract; 5g Na Cl and 1g KH2 PO4),according to Guerin-Danan et al., (1998). Lactobacilli was enumerated on DeMan Rogosa and Sharp(MRS) medium as suggested by Rogosa and Sharp (1959). The counts of *Str. thermophilus* were determined on Lee agar medium(Lee et al., 1974). Fecal bifidobateria was determined on modified MRS medium(Dave and Shah, 1996). Coliform count was estimated on VRBA medium as recommended by Klein and Fung, (1978). While staphylococci counts were estimated on staph 110 medium as suggested by APHA, 1992.

Statistical analysis:

The results were subjected to standard deviation and signification was tested by students "T" test (Statistical Graphics Crop, 1998).

RESULTS AND DISCUSSION

Total fatty acids of date palm extract, fried, non fried cotton seed oil, plain yoghurt, yoghurt supplemented with 5% dibs and biogarde supplemented with 5% dibs.

The presence of unsaturation due to C = C from oleic, lionleic and lionlenic acids, functions as the active sites for various oxidation reactions (El –Naggar, 2011). These reactions result in significant changes in fatty acid composition and caused TPC formation. Ultimately, the nutritional quality of the oil can be affected (El –Naggar, 2010).

From data presented in Table (1), it could be concluded that some fatty acids increased, whereas others decreased according the resultant products and the manufacturing method. In addition, it was of interest to notice that lionlenic acid was increased in all treatments, whereas, lionleic acid was decreased in all samples. On the other hand, arachidonic acid showed variable increases in the different treatments, whereas, decrease in fried, non fried cotton seed oils and date palm extract(dibs). Moreover, results obtained declared that stearic acid increased in all samples. It was clear from data obtained that non

fried oil possessed the highest content of lionleic acid, while, date palm extract(dibs) achieved the highest content of lionleic acid, whereas, biogarde supplemented with 5% dibs recorded the highest of arachidonic acid. In this respect, Shalaby et al., 1992 and Abd El-Tawab(2009) gave lower figures for essential fatty acids in plain yoghurt samples.

Generally, viewing the previous results, it might be deduced that biogarde fortified with 5% dibs attained the highest content of arachidonic acid, and relatively lower content of saturated fatty acids which influence and improved its nutritional and therapeutic properties. Thus, from the previous results, it could be concluded that fermented dairy products lead to relatively reduce the levels of hyperplasia and focal large cell dysplasia liver cells. The effect of the date palm extract, fried, non fried cotton seed oils, and fermented dairy products on rats intestinal microflora are reflected on their feces.

Effect of oral dose of date palm extract, plain yoghurt, yoghurt supplemented with 5% dibs and biogarde supplemented with 5% dibs on fecal bacterial populations.

It was evident from the data in Table (2), that the effect of oral dose of date palm extract(dibs), plain yoghurt and biogarde fortified with 5% dibs on rats intestinal microflora. Therefore, considerable variations among microflora groups were detected in feces samples. Additionally, it was obvious that biogarde supplemented with 5% dibs gave the highest values for lactobacilli and bifidobacterial counts being log 8.40 and 6.53 respectively. This finding may attributed to the use of both *Lb. acidophilus* and *Bif. bifidum* in manufacturing of this product. On the other hand, the staphylococci and colifom bacterial count were greatly reduced in the faces of the rats fed on different fermented dairy products. Also, it appeared that feeding rats on biogarde supplemented with 5% dibs and yoghurt supplemented with 5% dibs had more pronounced effect in reducing coliforms and staphylococci bacterial counts. This results are in complete agreement with those found by Zommara et al., 2006 and Abd El-Tawab, 2009. In this connection, Chen et al., 2000 reported that ingestion of yoghurt increased the number of stool bididobacteria and suppressed coliform bacterial count in human intestinal .

Thus, from results obtained, it could be concluded that fermented dairy products led to modulate the microflora population in rats intestine in a way that may enhance their health through removing the pathogenic bacteria and impairment of liver, testis and kidney cells (Karima Dhaouadi et al.,2011).

Total polar compounds represent a good marker of the total alteration of fried oils. TPCs markedly increased in initial experimental after frying for different periods. Such results lead us to hypothesize that the intake of these fried oil (over 25% TPC) could differentially affect several aspects of adverse effects. Jaswir et al. (2000); Dimitra et al. (2002) and El- Naggar, 2011. Thus, we fed rats for 28 days with the non fried or the 40 hrs fried oils to study the histopathological changes. As well know, also excessive amounts of a very high omega – 6 / omega -3 ratio promote the pathogenesis of many diseases, including cardiovascular disease, cancer and autoimmune disease, 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 of the chronic disease. Herein, repaired system depended on traces elements, balanced ratio of omega – 6 :omega -3 essential fatty acids, fiber and antioxidants(Simopoulos, 2004 and Burris et al.,2013).

Table (1): Total fatty acids of date palm extract, fried, non fried cotton seed oil, plain yoghurt, yoghurt supplemented with 5% dibs and biograde supplemented with 5% dibs.

Treatments / Components	Non-fried oil 5.5%TPC	Fried oil 25%TPC	Date palm Extract			
			Date palm Syrup(dibs)	Plain yoghurt	Yoghurt with 5% dibs	Biogarde with 5% dibs
C6: 0	0.18	0.30	0.601	1.037	0.937	0.831
C8: 0	0.25	0.49	0.549	2.120	1.856	1.673
C10: 0	0.20	0.35	0.385	1.750	1.732	1.644
C12: 0	0.35	0.85	7.769	2.095	2.092	2.120
C14: 0	0.52	0.20	13.576	8.072	7.965	7.687
C16: 0	16.73	28.6	23.260	26.735	23.291	20.756
C18: 0	2.99	5.55	4.021	12.126	14.965	15.974
C20: 0	0.22	0.18	0.141	0.420	0.398	0.606
Total saturated fatty acids	21.4	36.48	50.302	54.355	53.236	51.321
C 14:1	0.21	0.38	3.091	2.109	3.075	3.091
C16:1	0.26	0.28	5.147	5.467	4.753	4.122
C 18:1	23.10	32.50	34.765	30.971	32.046	34.079
C18: 2	54.50	29.65	5.497	3.205	3.095	3.093
C18: 3	0.07	0.30	1.056	2.486	2.433	2.751
C18: 4	0.45	0.41	0.042	1.40	1.462	1.543
Total unsaturated fatty acids.	78.59	63.25	49.598	45.638	46.764	48.679

Table (2):Effect of oral dose of date palm extract, plain yoghurt, yoghurt supplemented with 5% dibs and biogarde supplemented with 5% dibs on fecal bacterial populations.

Treatments / Parameters log cfu/gm	Non-fried oil 5.5%TPC	Fried oil 25%TPC	Date palm Extract			
			Date palm Syrup(dibs)	Plain yoghurt	Yoghurt with 5% dibs	Biogarde with 5% dibs
Lactobacilli count	6.45	5.34	7.58	8.30	8.35	8.40
Str.thermophilus	ND	ND	ND	6.76	6.55	6.82
Bifidobacterial count	5.20	3.52	4.63	5.45	5.40	6.53
Coliforms	4.30	4.75	4.20	3.58	3.43	2.66
staphylococci	4.10	4.53	4.00	3.92	3.85	3.44

Pathological changes:

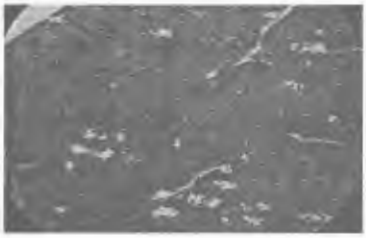
The transverse section of the liver of rats fed on different treatment diets are shown in plate(1), it could be observed that transverse section of the liver of rats fed on oil diets which containing the higher of TPC(formed during intermittent frying of potato chips for 40 hrs at five consecutive days),clinical signs observed. The sings observed in this group were the most severe in comparison to those observed in the other tested treatments group. TPC-treated rats group exhibited severe histopatheogical changes such as: marked congestion and dilatation of central vein, preserved architecture, focal (spotty) infiltration of portal tract by cute inflammatory cells, cellular and nuclear hypertrophy, kuppffer cell hyperplasia and necrosis. Several studies illustrate the mechanism by TPCs, in general, could promote oxidative stress (Carthew et al.,2001 and Saaffi et al.,2011). The increase in the TPCs levels indicates an enhanced lipid peroxidation leading to tissue injury and formation of excess free radicals resulting to non maintain the concentration of arachidonic acid in membranes suffering from oxidative stress (Lopez-Varela, 1995 and Carthew et al., 2001). The change in the structure of liver tissue may be related to the adverse effect of the dietary thermally oxidized oil (El-Naggar, 2007).

In contrast, the histological examination of tissue sections from rats exposed to date palm syrup (dibs) and / or fermented dairy products(plain yoghurt) non enriched with 5% dibs showed an improvement of liver morphology except for mild inflammation, preserved architecture and hydropic degeneration of hepatocytes mostly the periphery of lobular. Necrotic cells and vacuolization are nearly absent. While, the histological examination of tissue sections from rats exposed to fermented dairy products supplemented with 5% dibs showed normal liver histological aspects with central vein congestion. The protective action of antioxidant (total phenolics) may be due to an inhibition of reactive oxygen species (Saaffi et al., 2011). The antioxidant considered as compensatory mechanism used by cells to maintain the concentration of arachionic acid in membrance suffering from oxidative stress and to facilitate repair of liver cells (Carthew et al., 2001 and El-Naggar, 2007). These observations are supported by those of Miller et al., 2003 and Saaffi et al., 2011.

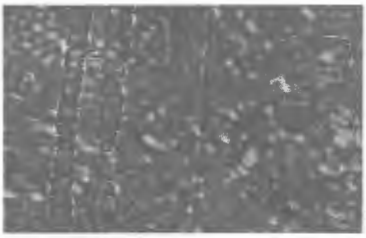
The transverse section of the kidney of rats fed on different treatment diets are shown in Plate(2), it could be observed that, transverse section of the rats fed on fried oil diets, which containing the over 25%TPCs,clinical signs observed. The signs observed in TPC-treated rats group were the most severe in comparison to first control rats group or rats groups exposed to date palm syrup (dibs), plain yoghurt, yoghurt supplemented with 5% dibs and biogarde supplemented with 5% dibs. TPC-treated rats group exhibited severe histopathological changes such as cloudy swelling in both of PCT (proximal convoluted tubules)and DCT (distal convoluted tubules),fatty change and atrophy of epithelial cells, intra abdominal fat deposition and fat deposition within the abdominal cavity nephrocalcinosis.

In contrast, histological changes of tissue sections from rats exposed to dibs and / or fermented dairy products enriched with 5% dibs showed an improvement of kidney morphology except for cloudy swelling in PCT and DCT. These observations are supported by those of Al – Shahib and Marshal, 2003; Zommara et al., 2006 and El – Naggar, 2007 and Gad et al.,2010.

The transverse section of the testis of rats fed on different treatment diets are shown in Plate(3), it could be observed that, transverse section of the testis of rats fed on fried oil diets which containing over 25% TPC, clinical signs observed. The signs observed in this group were the most severe in comparison to the first control rats groups and / or rats groups exposed to dibs, plain yoghurt, yoghurt fortified with 5% dibs and biogarde fortified with5%dibs. TPC treated rats group exhibited severe histopathological changes such as: improperly fixed and poor spermatogenesis, drastic unilateral degenerative changes which were prominently seen in many of the tubules. Some of the seminiferous tubules

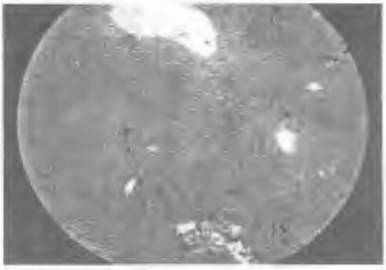


The second rat control group (non fried control seed oil 5.5 % TPC).



The first rat control group (fried cotton seed oil over 25% TPC)

Group I given date palm syrup (dibs).

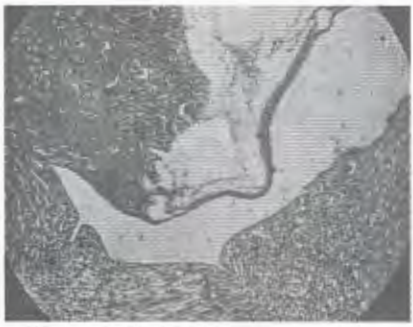


Group II given Plain yoghurt.

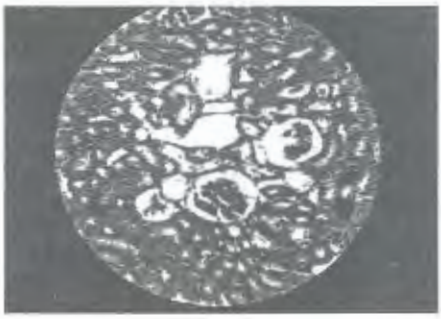
Group III given yoghurt supplemented with 5% dibs

Group IV given bigoarde supplemented with 5% dibs

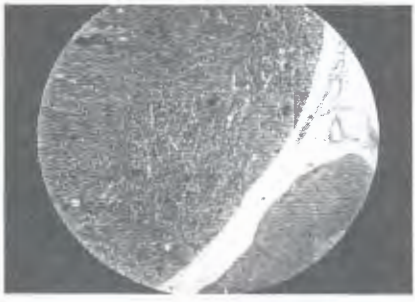
Plate (1) : Stan : hematoxlin liver transverse section of rat fed on different diets.



The second rat control group (non fried control seed oil 5.5 % TPC).

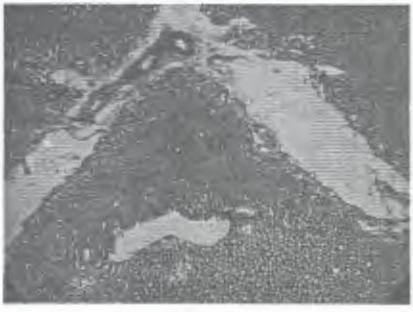


The first rat control group (fried cotton seed oil over 25% TPC)

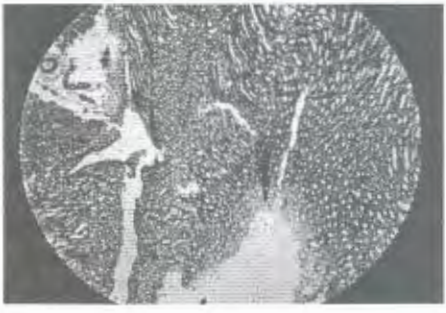


Group I given date palm syrup (dibs).

Group II given Plain yoghurt.



Group III given yoghurt supplemented with 5% dibs



Group IV given bigoarde supplemented with 5% dibs

Plate (2) : Stan : hematoxlin kidney transverse section of rat fed on different diets.

empty of spermatogenesis. Also, some of spermatozoa. Similar results were found in other types(Kotwal et al., 1993; Lopez- Varela et al., 1995; Carthew et al., 2001 and El- Naggar, 2007). In contrast, histopathological changes of testis tissue sections from rats exposed to date palm syrup (dibs) showed wherein several seminiferous tubules with occasional patches of interstitial cells of ley dig. But the transverse section of the testis tissue from rats exposed to fermented dairy products supplemented with 5% dibs showed a normal histological profile in all the stages of spermatogenesis. These observations are in the same line with those observed by El- Naggar, 2007 and Saaffi et al., 2011).

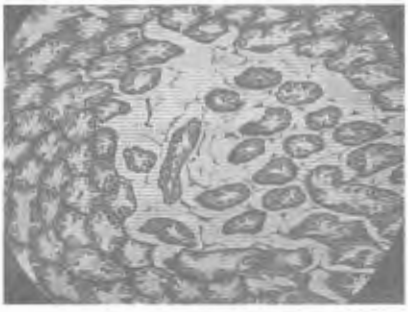
The results also shown that administration of TPCs- induced hepatotoxicity. This is clearly evident by GOT, GPT...etc. A significant abnormal changes in serum parameters (data not shown) accompanied by histological alteration including mono and poly unclear cell infiltration in the portal area added to congestion, necrosis and kupffer cell hyperplasia in the liver tissues. While, fatty changes and atrophy of epithelial cells, intra abdominal fat deposition and fat deposition within the abdominal cavity and nephrocalcinosis in the kidney tissues. Also, observed improperly fixed and poor spermatogenesis, drastic, unilateral degenerative, empty of spermatogenesis and gaint spermatocytes in many of the tubules of testis tissues.

On the other hand, examination of tissue sections of liver, kidney and testis from rats exposed to date palm syrup(dibs) and / or fermented dairy products supplemented with 5% dibs showed an repairment of liver, kidney and testis tissues except mild inflammation and mild congestion in liver and kidney tissues. The accumulation of lipids within the macrophages may be due to impairment in lipid catabolism (Carthew et al., 2001) Noteworthy, fermented dairy products decreased the oxidative stress in rats tissues (Zommara et al., 2006). In addition, the oxidized fatty acids are released several times more readily than unoxidized fatty acids as a compensatory mechanism used by cell to maintain the concentration of arachidonic acid in membranes suffering from oxidative stress and to facilitate repair(Lopez-Varela et al., 1995). Since both of the date palm syrup (dibs) and / or fermented dairy products supplemented with 5 % dibs are very rich in nutrition. However, there are a number of inconsistencies in published data, balanced of nutritional constituents and containing cultures of probiotics bacteria strains. Furthermore, arachidonic acid can block the production of several products related to the inflammatory process, such as cytokines and interferon released by macrophages and lymphocytes and soluble phase inflammatory mediators released by neutrophils at the site of injury(Harris, 1990). Moreover, arachidonic acid can weakly inhibit the proliferation of T cells (Lopez – Varela et al., 1995). Thus, arachidonic acid could be an important mechanism to facilitate liver membranes repair as for control and repair of the oxidative injury. In addition, to stimulating the kidneys to expel toxic bodily wastes (Gad et al., 2010).

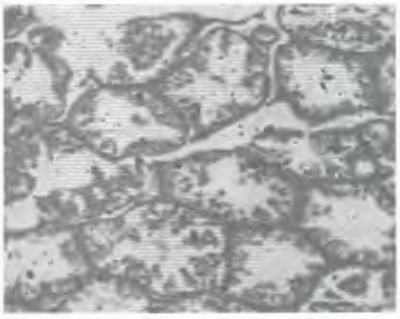
In conclusion, the observed results showed an repairment of liver, kidney and testis tissues from rats exposed to date palm syrup(dibs), plain yoghurt, yoghurt supplemented with 5%dibs and biograde supplemented with 5% dibs. Noteworthy, the date syrup (dibs) and / or fermented dairy products fortified with dibs may enhance their health through modulating fried oil metabolism.

Acknowledgement:

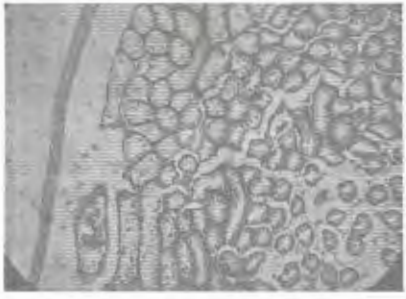
The authors are thankful to Prof. Dr. Mohamed Galal, Professor of Histopathology Dept., Faculty of Medicine, Assiut University, for help and advice.



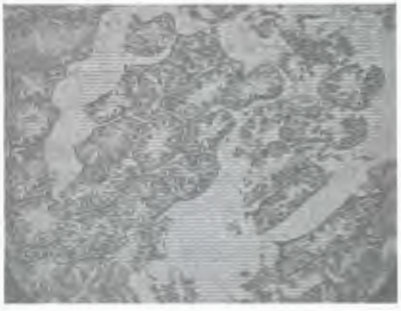
The second rat control group (non fried control seed oil 5.5 % TPC).



The first rat control group (fried cotton seed oil over 25% TPC)



Group I given date palm syrup (dibs).



Group II given Plain yoghurt.

Group III given yoghurt supplemented with 5% dibs

Group IV given bigoarde supplemented with 5% dibs

Plate (3) : Stan : hematoxlin testis transverse section of rat fed on different diets

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التأثير الواقي لبعض منتجات الألبان المتخمرة المدعمة بالدبس على المركبات القطبية الكلية المتكونة اثناء القلى العميق

الجزء الثانى: عن طريق الفحص الهستوباثولوجى للفئران

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الملخص العربى

اعتاد الناس اليوم تناول منتجات القلى فى الزيوت الغذائية المعرضة لدرجات الحرارة المرتفعة ،وعلى فترات زمنية متعاقبة مما أدى إلى إنتاج المركبات القطبية الكلية ذات التأثير البيولوجى غير المرغوب. لذا تم التخطيط لهذا البحث بغرض التقييم الهستولوجى لمجموعات الفئران المعاملة.

حيث تم تقسيم مجموعات فئران التجارب إلى قسمين رئيسين:أحدهما تناولت وجبة قياسية تحتوى على زيت بذرة قطن غير معامل (٥.٥% مواد قطبية كلية) والثانية تناولت وجبة غذائية تحتوى على زيت بذرة قطن معامل (أكثر من ٢٥ %مواد قطبية كلية) لمدة ٢٨ يوما .

ثم قسمت المجموعة الثانية إلى أربع مجموعات كالتالى :

١-مجموعة فئران التغذية على شراب التمر (الدبس).

٢- مجموعة فئران التغذية على اليوجورت العادى.

٣- مجموعة فئران التغذية على اليوجورت المدعم ب ٥% دبس.

٤- مجموعة فئران التغذية على البيوجارد المدعم ب٥% دبس .

للتعرف على مدى تأثير هذه المعاملات على التغيرات الهستولوجية فى أكباد وكلى وخصى فئران المجموعات المعاملة .وقيمت نتائج التحليل الكمي للأحماض الدهنية من حيث التشبع وعدمه فى كل من زيت بذرة القطن المقلى وغير المقلى ومنتجات الألبان المتخمرة وتلك المدعمة بالدبس.

ودلت النتائج المتحصل عليها على مايلى :

إرتفاع عدد البؤرات المرضية بأنسجة الأعضاء المختبرة من جراء التغذية على زيوت قلى تجاوزت نسبة المواد القطبية بها لأكثر من ٢٥% مقارنة بالكنترول .كماتبين من خلال الفحص الميكروسكوبى للأعضاء المختبرة ،قدرة شراب التمر(الدبس) ومنتجات الألبان المتخمرة وتلك المدعمة به على تدعيم نظم إصلاح أنسجة الكبد والكلى والخصية .كما أدت التغذية على شراب التمر(الدبس) أو منتجات الألبان المتخمرة والمدعمة بالدبس إلى زيادة أعداد بكتريا حامض اللاكتيك والبيفيدوبكتيريا فى براز الفئران مقارنة بالكنترول ،وكانت منتجات الألبان المتخمرة وخصوصا المدعمة بالدبس والمتخمرة سواء بالبيفيدوبكتيريا أو بكتيريا حمض اللاكتيك هى الأعلى فى تثبيط نمو بكتيريا الاستافيلوكوكاى ومجموعة بكتيريا القولون .