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Study The Therapeutic Effects Of Palm Dates (*Phoenix Dactylifera*l.) And Palm Seeds Extracts On Cadmium-Induced Toxicity In Rats

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Abstract : The main target of the present investigation was to study the effect of palms date (*Phoenix dactylifera*L.) and palm seeds to get rid the toxicity of cadmium in albino rats. Forty healthy adult male albino rats weighing 150±10g , were used and divided into 8 equal groups, one was kept as a negative control group, while the second group fed on basal diet with cadmium at the level (5 mg/L) in drinking water (control positive group) for the purpose of poisoning and groups 3 , 4 and 5 rats were fed on basal diet plus Cd (5mg/L) and received 2.5, 5 and 10 ml of respectively.While, groups 5,7 and 8 fed on basal diet and received 2.5 ,5 and 10 ml palm seeds extract respectively by oral tube for 28 days. At the end of the experiment, feed intake (FI), body weight gain (BWG), feed efficiency ratio (FER) and weights of liver, and kidneys were calculated. Also, Serum liver functions (GOT, GPT, ALP), kidney functions (Urea, CR, ALb) ,lipid profile (T.Ch, TG, LDL, HDL,) were determined in serum. Histopathological changes of liver and kidney were examined. The obtained result concluding that feeding with the tested plant parts improved kidney functions and liver functions.

*Key Words :*Histopathological examination, palm dates extract, liver and Kidney Functions, blood lipid profile.

1. Introduction

Heavy metals are probably the oldest toxins known to humans. cadmium usage may have begun prior to 2000 B.C **(Ng and Patterson,1981).** Heavy metals differ from other toxic substances in that they are neither created nor destroyed by humans. Never the less ,their utilization by humans influences the potential for health effects in , at least two major ways : First ,by environmental transport ,that is ,by

human or anthropogenic contributions to air ,water ,soil ,and food . second :By altering the speciation or biochemical form of the element **(Beijer and Jernelov, 1986).** Heavy metals is a general collective term, which applies to the group of metals and metalloids with atomic density greater than 4 g/cm ^{3} , or 5 times or more, greater than water **,** The term "heavy metals" refers to any metalic element that has a relatively high density and is toxic or poisonous even at low concentration **(Lenntech, 2004).**

Heavy metals occur as natural constituents of the earth crust, and are persistent environmental contaminants since they cannot be degraded or destroyed. To a small extent, they enter the body system through food, air, and water and bio-accumulate over a period of time (**Lenntech, 2004 and UNEP/GPA, 2004**). However, being a heavy metal has little to do with density but concerns chemical properties. Heavy metals include lead (Pb), cadmium (Cd), zinc (Zn), mercury (Hg), arsenic (As), silver (Ag) chromium (Cr), copper (Cu) iron (Fe), and the platinum group elements **(Farlex, 2005).**

Cadmium was first recognized in ores containing zinc carbonate in 1817 **(NRC,1993).** International Agency for Research on Cancer (IARC) has classified cadmium and cadmium compounds as carcinogenic to humans , meaning that there is sufficient evidence for their carcinogenicity in humans **(IARC ,1987) .** Commercial cadmium production started only at the beginning of the 20Th century. Initially, its main use was in electroplating, but since 1960, cadmium has been used for manufacturing nickel–cadmium batteries. Cadmium is also used in paint pigments, for electroplating , in making polyvinyl chloride plastics, phosphate fertilizers, incineration of electronic wastes and tobacco smoking **(IPCS, 1991).**

Human exposure to heavy metals such as cadmium could pose serious health challenges, especially among occupationally-exposed workers **(WHO, 2007).** Cd is mainly absorbed by inhalation but there may be also additional intake from eating contaminated food at work due to poor personal hygiene at the place of work. For acute exposure by ingestion, the principal effects are gastrointestinal disturbances such as nausea, vomiting, abdominal cramps and diarrhea **(Elinder, 1985).** Chronic obstructive airway disease has been associated with long-term inhalation of cadmium **(Nordberg, 2006).**

The history of palm dates had been known from ancient times with a 7000 year old history as the earliest tree planted in earth especially in arid and semi arid area **.** Therefore, date fruits become the staple food and source of economics among the countries within the region **(Elleuch*et al*., 2008 and Hasnaoui*et al*., 2010).** Plant extracts have been used for a wide variety of purposes for many thousands of years.

Renewed interest in natural preventives. Many researches have documented the antifungal and antibacterial effects of plants **(Irkin and Korukuoglu , 2009)**.

Palm dates (*Phoenix dactyllifera L.*) have always been a valuable crop in arid and semiarid parts of the world and play an important role in the economic and social lives of the people of the sezones**(Besbes*et al*., 2004).** The seed powder has multiple uses date seeds are discarded or used mainly as animal feeds for cattle, sheep, camel and poultry**(Rahman,*et al*.,2007).**

The palm dates and palm seeds can beuesed as a good source of minerals, and can also be used to substitute the usage of barley in food products for the same purpose **(Ali-Mohamed and Khamis2004).** The date seed that is rich in protein, fat and dietary fiber **(Al-Farsi and Lee, 2008).**

This study aimed to investigate the possible of therapeutic effect of date palm (*Phoenix dactylifera L.)*and date palm seeds extracts on cadmium-induced toxicity in rats

1-Determine the chemical composition of date palm and date palm seeds extract.

2-Evaluate the effect of date palm and date palm seeds extract on feed intake, body weight gain and feed efficiency ratio of cadmium-induced toxicity .

3-Evaluate the effect of date palm and date palm seeds on organs weight (Liver ,Heart ,Kidney ,Spleen and) of cadmium-induced toxicity .

4-Study the effect of date palm and date palm seeds extracts on liver functions ,kidney functions of cadmium induced toxicity rate .

5-Evaluate the effect of date palm and date palm seeds extracts on lipid profile and atherogeric index(AI) of cadmium induced toxicity rate .

6-Identify the histopathological structure by affecting of date palm and date palm seeds extract of liver and kidney organs of cadmium induced toxicity rate .

2. Materials And Methods

2.1- Materials

2.1.1-Plant Parts

Palm dates were obtained from local market in Shebin El-Kom ,Menoufia ,Egypt. Palm seeds were obtained from processing date factory .

2.1.2 Animals

Forty male albino rats spargue - Dawley strain, weighing 150±10 g, were used in this study which obtained from the research Institute of Ophthalmology, Medical Analysis Department, Giza, Egypt. Rats were housed in individual wire cages in the animal house of Home Economics , Menoufia University under the normal laboratory condition

and fed on basal diet for seven consecutive days as adaptation period. Diets were introduced to rats in a special non-scattering feeding cup to avoid loss of food and contamination. Tap water was provided to rats by means of glass tubes projecting through wire cages from inverted bottles supported to one side of the cage. Feed and water checked daily

2.1.3 cadmium

Pure chemical final cadmium chloride ($CdCl_2$) as a toxic chemical according to **Jiménez-Ortega *et al.* (2010)** was obtained from EL-Gomhoryia Company for trading Drugs, Chemicals and Medical instrument, Cairo, Egypt .

2.1.4.Basal diet

Casein, vitamins mixture , minerals mixture ,cellulose and starch were obtained from Technogene Co. Giza,Egypt.

2.2 Methods

2.2.1 plant part Preparation

Palm date were properly washed with tap water to remove all pulp material completely, one-hundred gram of palm dates powder was added to one litre of distilled water for 12 hours and filtered through cotton then stored at 4ºC until use.

Palm seeds were clean and washed with tap water, dried for 2-3 days at room temperature, hard seed crushed into small pieces, and then powder was made after grinding in coffee grinder. One-hundred gram of seeds powder was added to one litre of distilled water for 12 hours and was filtered through cotton then store at 4ºC until use. Treated with palm dates and palm seeds extract in dosage of (2.5ml/once a day) ,(5ml/once a day) , (10ml/ Twice a day) by oral according to the method described by **El Fouhil *et al*. (2011).**

2.2.2 Cd toxicity induction

Cadmium toxicity was induced in normal male albino by adding 5mg / L of cadmium in drinking water during the experiment (28 day) according to the method described by **Jiménez-Ortega *et al.* (2010)**

2.2.3 Experimental design

The rats were divided into 8 groups (5 rats per each) as follow: Group (1): Control negative (-ve) , in which normal rats were fed on basal diet for 28 days. Group (2): Control positive (+ve) , in which cadmium toxicity by $CdCl_2$ (5mg/L) were fed on basal diet for 28 days. Group (3): Rats were fed on basal diet consists of Cd (5mg/L) and (2.5 ml) palm dates extract by oral tube for 28 days .Group (4): Rats were fed on basal diet consists of Cd (5mg/L) and 5 ml palm dates extract. Group (5): Rats were fed on basal diet consists of Cd (5mg/L)and 10ml palm dates extract. Group (6): Rats were fed on basal diet consists of Cd (5mg/L) and 2.5 ml palm seeds extract. Group (7): Rats were fed on basal diet consists of Cd (5mg/L) and 5ml palm seeds extract . Group(8):

Rats were fed on basal diet consists of Cd (5mg/L) and 10 ml palm seeds extract .

2.2.4 Biological evaluation

During the experimental period (28days), the diet consumed was recorded every day and body weight was recorded every week. The relative body weight gain (BWG %), feed efficiency ratio (FER), and organs weight (%)were determined according to **Chapman *et al*. (1959)** using the following equations:

Body Weight Gain (BWG) = Final weight (g) – Initial weight (g)×100 / Initial weight (g)

Feed Efficiency Ratio (FER) = Gain in body weight (g) / Feed intake (g)

2.2.5 Blood sampling and organs Extraction

From all the previously mentioned groups, blood samples were collected after 12 hours fasting at the end of the experiment using the abdominal aorta. Blood samples were received into dry clean centrifuge tubes and left to clot at room temperature for half an hours then centrifuged for 10 minutes at 3000 r.p.m to separate the serum. Serum was carefully aspirated and transferred into clean quit fit plastic tubes and kept frozen at; (-20 °c) until analysis **Malhotra (2003).** All serum samples were analyzed for the following parameters: Glucose according to the method of **Trinder (1969),** triglycerides according to **Fossati and Prencipe (1982)**, total cholesterol according to the method of **Allain,(1974)**, HDL according to the method of **Lopez,(1977),** VLDL and LDL according to the method of **Lee and Nieman (1996)**, (AST and ALT) according to the method of **Henry (1974)**, (ALP) according to the method of **Belfield and Goldberg, (1971),** creatnine according to the method of **Henry, (1974),** uric acid according to the method of **Doumas *et al.* (1971)**. At the same time, the organs liver and kidney were removed, washed in salin solution, wiped by filter paper and weighted according to the method described by **Drury and Wallington (1980)**. Small specimens from liver and kidney were immersed in 10% neutral buffered formalin, dehydrated in ascending concentration of ethanol (70, 80 and 90%) , cleared in xylene and embedded in paraffin . Sections of 4 - 6 Mm thickness were prepared and stained with hematoxylin and eosin according to **Bancroft *et al.* (1996)**.

2.2.7 Statistical analyses

The data were statistically analyzed using a computerized SPSS v20 program by one way **ANOVA** . The results are presented as mean ± SD .Difference between treatments at $P \leq 0.05$ were considered significant.

3. Results And Disscusion

Bwg , Fi ,Fer

Results in Table (1) illustrated that the effect of cadmium inducted toxicity in rats with date and date seeds extract on relative body weight gain (BWG),feed intake (FI) and feed efficiency ratio (FER). As shown in the table, it could be noticed that taking the extract of date palm and its seed extract at different levels led to improve the relative body weight and fed intake when compared to positive control group . There is no significant among groups fed on 5 and 10 ml date palm extract and negative control group for relative body weight. For feed intake, there is no significant among group 4, 5 and 8 and negative control group. The effect of date palm extract was better than the effect of its seeds extract. In case of feed efficiency ratio, there is no significant among group4,5,7and8 and negative control group while these groups were significant when compared to positive control group. Potential health problems associated with a high intake of products which contain salt of cadmium have been linked to decreased energy intakes, weight gain and the weight loss epidemic as indicated by **Elinder(1985) .**Meanwhile, **Nordberg, (2006**) found that the rising consumption of vegetables fertilizer and meat additives provides a rising intake of cadmium which can contribute to weight loss and underweight.Also, study done by **Farlex, (2005**) increased cadmium consumption would decrease total energy intake by decreased appetite and decreased fat intake**.Rahman*et al*.(2007**) found that high intake of date palm which used as food additives in soft foods, has been linked to increase body weight. This effect led to high content of dietary fiber, phenols as antioxidants compound. Also, **they** found that molokhia leaves increased weight gain to contained many biological active compounds including chymopapain and papain which is the ingredient that aids digestive system and a good supply of vitamin A and C that are highly essential for maintaining a good health.

Table (1) : Effect of palm dates and palm seeds extract levels on BWG , FI , FER

Group	BWG(%) Mean ± SD	FI (g/rat /day) Mean ± SD	FER (g/rat/day) Mean ± SD
(G1) Control (-)	0.52^{a}± 0.02	20.15^{a} ±0.002	0.026^{a}±0.009
(G2) Control (+)	0.14^{d}± 0.01	12.36^{c} ±0.005	0.011^{c}±0.002
(G3)Date palm extract 2.5%	0.36^{c}± 0.03	17.83^{e} ± 0.005	0.020^{b}±0.005
(G4) Date palm extract 5%	0.48^{a}±0.02	18.50^{a}± 0.104	0.025^{a}±0.001
(G5) Date palm extract 10% Date palm extract 2.5%	0.50^{a}± 0.05	19.65^{a} ± 0.001	0.026^{a}±0.003

(G6) Date palm seeds extract 2.5%	0.36^{c}± 0.03	16.03^{b} ± 0.005	0.020^{b}±0.005
(G7) Date palm seeds extract 5%	0.38^{c}±0.05	16.47^{b} ± 0.001	0.022^{a}±0.005
(G8) Date palm seeds extract 10%	0.43^{b}±0.02	18.47^{a} ± 0.005	0.024^{a}±0.001

Means in the same column with superscript letters are significantly different at p≤0.05.

Organs weight:

Data in Table (2) results showed that the effect of cadmium toxicity in rats with date and date seeds extract at different doses on organs weight. It could be found that for liver weight , there is no significant between all tested groups except group 4 with positive control group and also there is no significant between group 4 and negative control group. For heart weight there is no significant among groups 4,5 and 8 and negative control group. As shown in the table, the best effect on the organs weight was 10 ml date palm extract followed by 10 ml seeds extracts and 5 ml of date extract . Taking cadmium in positive control group had a negative effect on the organs weight which caused increasing the organs weight and this increasing was statically significant.

Table (2) : Effect of Palm dates and Palm seeds extract on Liver , Heart , Kidney, Spleen and Lungs weight .

Paramete	**G1 Control (-)**	**G2 Control (+)**	**G3 Palm Dates extract 2.5%**	**G4 Palm Dates extract 5%**	**G5 Palm Dates extract 10%**	**G6 palm seedsextract 2.5%**	**G7 palm seedsextract 5%**	**G8 palm seeds extract 10%**
Liver	5.70 ^{b} ± 3.1	7.40^{a}± 0.5	7.20 ^{a} ±0 .2	6.00 ^{b} ± 0.3	6.90 ^{a} ± 0.3	7.30 ^{a} 0.55	7.10 ^{a} ±0.3	6.90 ^{a} ± 0.24
Heart	0.77^{b} 0.12	0.92 ^{a}±0.0	0.87 ^{a}± 0.5	0.80 ^{ba}± 0.1	0.79 ^{ba}± 0.0	0.90 ^{a}± 0.8	0.90 ^{a}± 0.1	0.82 ^{ba}± 0.05
kidney	1.35^{b} 0.122	1.76^{a} ± 0.30	1.50 $^{a b}$ ± 0.	1.49$^{a b}$ ± 0.1	1.40$^{a b}$ ± 0.7	1.67^{a}± 0.0	1.60$^{a b}$ ± 0.2	1.53$^{a b}$ ± 0.14

Lungs	1.25[b] ±0.8	1.55[a] ± 0.12	1.47 [a]± 0.95	1.30[ab] ± 0.8	1.27[ba] ± 0.9	1.57 [a] 0.12	1.47[a] ± 0.50	1.37 [b] ± 0.95
Spleen	0.72[c] ± 0.34	1.10[a] ± 0.8	0.97[a] ± 0.40	0.95[a] ± 0.25	0.790 [c]± 0.1	1.02 [a d] 0.55	0.890[b e] 0.48	0.850[bd]± 0.22

Means in the same row with different superscript letters are significantly different at $p \leq 0.05$.

Serum glucose

Table (3) results showed the effect of cadmium inducted toxicity in rats with date and date seeds extract on serum glucose. As shown in the table, the level of serum glucose decreased by increasing the level of date and its seeds extracts . the effect of date extracts levels were higher than th effect of seeds extract s. All tested groups showed significant changes with the negative control group . while G3 and G6 were non significantdifferencec when compared with positive control group . the level 10 ml from date palm extract was the best level which decreased the bad effect of cadmium on the serum glucose. A study carried out by **Mohan (2015**) first time on in vivo effect of date consumption by healthy subjects on serum glucose, lipids, and oxidative stress. After consumption ofndates, fasting serum glucose and triacylglycerol levels did not increased and serum triacylglycerol levels even significantly decreased, by 8 or 15%.The study concluded that the date consumption by healthy subjects, despite their high sugar content, demonstrates beneficial effects on serum triacylglycerol and oxidative stress and does not worsen serum glucose and lipid/lipoprotein patterns, and thus can be considered an antiatherogenic

Table(3): Effect of Palm dates and Palm seeds extract on serum glucose mg\dl

Variable	G1 Control (-)	G2 Control(+)	G3 Palm Dates extract 2.5%	G4 Palm Dates extract 5%	G5 Palm Dates extract 10%	G6 Palm seeds extract 2.5%	G7 Palm seedsextract 5%	G8 Palm seedsextract 10%
Glucose (mg\dl)	115.2 ^{d} ± 4.0	173.5 ^{a} ± 11.	171.8 ^{a} ± 4.5	165.3 ^{ab} ± 8.8	153.6 ^{c} ± 2.7	172.3 ^{a} ± 3.5	168.5 ^{b} ± 7.2	158.9 ^{c} ± 1.9

Means in the same row with different superscript letters are significantly different at $p \leq 0.05$.

Lipid profile:

The obtained data in Table (4) showed the effect of Cd inducted toxicity in rats with date and date seeds extract on serum lipid profile. As shown in the table, the normal levels of lipid profile were detected in negative control group while the abnormal levels were in positive control group . The mean levels of lipid profile was improved by increasing the level of date palm extract and its seeds . The level 10 ml of the tested extracts had the highest effect followed by 5 ml and the last one was 2.5 ml. Aqueous extracts of dates have also been shown to inhibit the lipid peroxidation and protein oxidation as well as exhibit a potent superoxide and hydroxyl radical scavenging activity **(Allaith, 2005). Panahi and Asadi (2009)** reported that extract of date fruit were useful in controlling the blood cholesterol levels and also protected the CA1 neurons against oxidative injury. Dates are also considered as renal restorative and their daily consumption can prevent the formation of renal calculi due to its diuretic and anti-inflammatory actions. A cup of hot decoction of seven dates, when taken twice daily for a period of 15 days, is considered as a remedy for lithontriptic and diuretic. A drink made from powdered date stones is also considered as lithontriptic for hepatic and renal calculi.

Table(4): Effect of Palm dates and Palm seeds extracton serum lipid profile (mg\dI)

Group	G1 Control(-)	G2 Control(+)	G3 Palm Dates extract 2.5%	G4 Palm Dates extract 5%	G5 Palm Dates extract 10%	G6 Palm seeds extract2.5%	G7 Palm seeds extract 5%	G8 Palm seeds extract10%
TC	103.2 ^{e} ± 4.25	145.62 ^{a} ± 2.24	124.69 ^{c} ± 1.98	115.8 ^{dd} ± 0.58	108.6 ^{e} ± 1.57	135.01 ^{b} ± 1.37	126.99 ^{c} ±1. 62	114.1 ^{d} ± 2.38
TG	79.14 ^{e} ± 0.946	126.23 ^{a} ± 4.20	117.15 $^{b\ b}$ ± 2.93	102.18 ^{c} ± 2.74	96.18 ^{d} ± 4.18	124.83 ^{a} ± 2.7	115.80 $^{b\ b}$ ± 2.40	97.48 ^{d} ± 2.56
VLDL	15.82 ^{d} ± 0.187	25.24 ^{a} ± 1.29	23.42 ^{a} ± 0.585	20.43 ^{b} ± 0.55	19.23 ^{b} ± 0.88	23.15 ^{b} ± 0.482	21.19 ^{b} ± 0.01	19.49 ^{b} ± 0.01
HLDL	64.14 ^{a} ± 3.7	34.15 ^{d} ± 2.03	41.73 ^{b} ± 2.5	43.61 ^{b} ± 4.8	48.43 ^{c} ± 4.07	42.15 ^{b} ± 2.6	46.71 ^{c} ± 1.4	46.62 ^{c} ± 1.4
LDL	22.97 ^{e} ± 1.8	53.60 ^{a} ± 2.7	40.84 ^{c} ± 2.6	40.68 ^{cd} ± 0.94	37.46 ^{d} ± 1.67	53.75 ^{a} ± 3.5	47.34 ^{b} ± 2.7	40.09 ^{d} ± 1.5

Means in the same row with different superscript letters are significantly different at p≤0.05.

Liver fanction

The effect of cadmium inducted toxicity in rats with date and date seeds extract on liver enzymes activities was tabulated in table (5). As shown in the table, the best effect was recorded for group 5 (cadmium inducted toxicity in rats which fed on 10% date palm extract). For AST, all tested groups were significantly higher than the negative control group and were significantly lower than the positive control group except G6.in case of ALT, there is no significant changes among G5,G8 and negative control , also, there is no significant among G4 G7 and positive control group. **Nordberg, (2006**) revealed that cadmium had a potential role to cause injuries in several organs and tissues. The increased consumption of lead sources in foods and drinks is linked with the hepatic metabolism and caused lipogenesis and ATP depletion, which leads to fat accumulates in the liver by the primary effect of NO oxidation. It could be hypothesized that increased lead sources consumption contributes to the development of non-alcoholic fatty liver disease (NAFLD) which can progress to cirrhosis over time in some individuals**.**

Ali-Mohamed and Khamis, (2004) showed date palm extract is one of the most important food which containing phenolic antioxidant compound and calcium (20.3%) which protected liver from any free radical. Also **Rahman*et al*.(2007**) found that date palm extraction

contained dietary fiber or essential oils , the flavonoids hesperidin and calcium which reduced the residual cadmium levels and the degree of lipid oxidation.

Table(5): Effect of date palm and date palm seeds extract on Liver function

Parameter	G1 Control(-)	G2 Control(+)	G3 Palm Dates extract 2.5%	G4 Palm Dates extract 5%	G5 Palm Dates extract 10%	G6 Palm seeds extract2.5%	G7 Palm seeds extract 5%	G8 Palm seeds extract10%
AST	37.6 ^{d} ± 9	113.7^{a} ± 42.0	104.53 ^{b} ±41.73	02.88^{b} ±6.9	5.08 ^{c} ± 21.5	10.36^{a} ± 42.0	1.13 ^{b}± 65.8	96.09 ^{c}± 23.38
ALT	2 43.77^{d} ± 4.7	72.57^{a}± 2.29	69.43^{b} ±5.04	53.85^{b} ± 1.79	45.44^{d}± 7.125	69.38 ^{b}± 6.01	58.68 ^{c} ± 6.32	47.92 ^{d} ± 1.41
ALP	52.56 ^{d} ± 0.21	130.25^{a} ± 0.3	125.15 a± 0.03	9.35 ^{b}± 0.14	107.19 ^{c}± 0.101	128.33 ^{a}± 0.22	21.41 ^{a} ^{b}± 0.14	111.1 ^{c} ^{a} ± 0.197

Means in the same row with different superscript letters are significantly different at $p \leq 0.05$.

kidney function

Results of Table (6) illustrated the effect of cadmium inducted toxicity in rats with date and date seeds extract on Serum kidney functions. It could be observed that the levels of kidney functions of negative control group significantly were lower than positive control . All tested groups recorded kidney functions levels were significantly lower than positive control while they were higher than negative control group. The best effect was recorded in group fed on dat palm at the level 10ml extract. It is a common belief in the Middle East that the consumption of dates, particularly in the morning on an empty stomach, can reverse the actions of any toxic material that the subject may have been exposed to **(Vyawahare*et al.*, 2009).**

Table(7): Effect of date palm and date palm seeds extract on kidney function

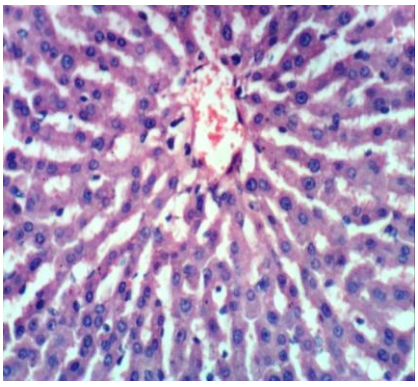
Parameters	G1 Control(-)	G2 Control(+)	G3 Palm Dates extract 2.5%	G4 Palm Dates extract 5%	G5 Palm Dates extract 10%	G6 Palm seeds extract 2.5%	G7 Palm seeds extract 5%	G8 Palm seeds extract 10%
Creatinine(mg/d	$0.65^{d}\pm$ 0.036	$2.70^{a}\pm$ 0.255	$2.02^{b}\pm$ 0.115	$1.103^{c}\pm$ 0.296	$0.760^{d}\pm$ 0.045	$2.08^{b}\pm$ 0.182	$1.973^{b}\pm$ 0.80	$1.08^{c}\pm$ 0.258
Uric acid (mg/d	$1.25^{d}\pm$ 0.200	$2.98^{a}\pm$ 0.366	$2.11^{b}\pm$ 0.361	$1.99^{c}\pm$ 0.055	$1.31^{d}\pm$ 0.21	$2.58^{b}\pm$ 0.226	$1.97^{c}\pm$ 0.53	$1.50^{d}\pm$ 0.389

Means in the same row with different superscript letters are significantly different at $p \leq 0.05$.

3.4. Histopathological examination

Liver

Microscopically, liver of rat from group (1) showing the normal histological structure of hepatic lobule (photo.1). Meanwhile , liver of rat from group (2) showing fatty change of hepatocytes (photo.2) , dilatation and congestion of central vein and hepatic sinusoids (photo.3). However , liver of rats from group (3) showing dilatation and congestion of hepatic sinusoids and binucleation of hepatocytes (photo.4). Liver of rats from group (4) showing focal hepatic necrosis associated with inflammatory cells infiltration (photo.5) , no histopathological changes (photo.6).Liver of rats from group (6) showing portal infiltration with inflammatory cells (photo.7), Kupffer cells activation(photo.8). However , liver of rats from group (7) showing Kupffer cells activation (photo.9) , no histopathological changes(photo.11). Alao, liver of rat from group (8) showing no histopathological changes (photo.12).



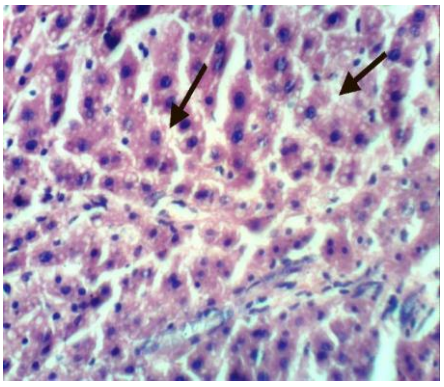


Photo (1): Liver of rats from group (1) (control -) showing the normal histological structure of hepatic lobule (H&E X 400).

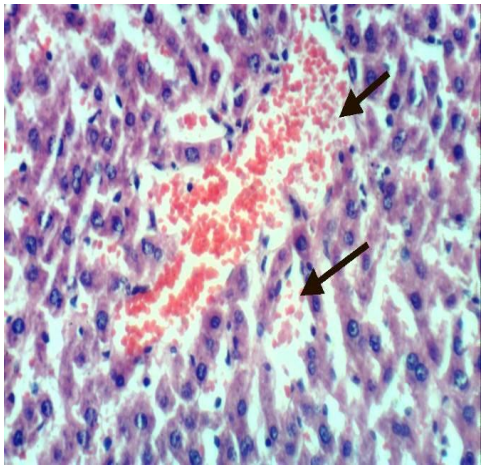


Photo (2) : Liver of rats from group (2) (control+) showing fatty change of hepatocytes . (H & E X 400).

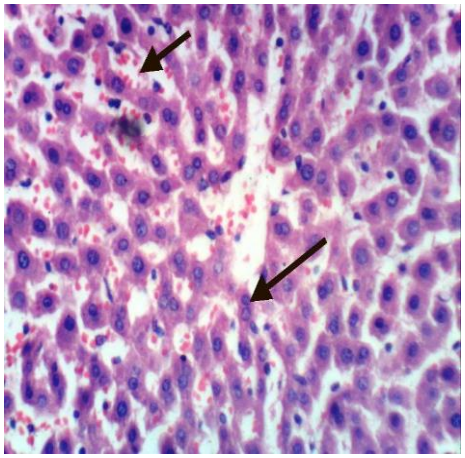


Photo (3): Liver of rats from group(2) (control +) showing dilatation and congestion of central vein and hepatic sinusoids (H & E X 400).

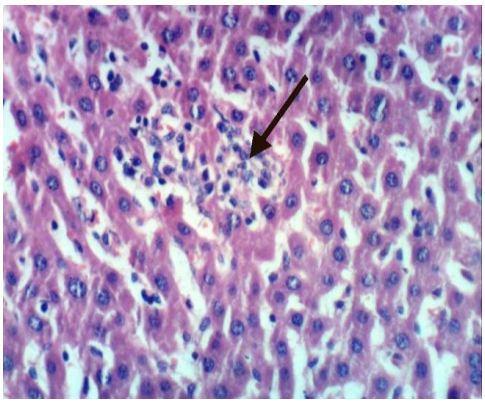


Photo (4): Liver of rats from group (3)(palmdates extract 2.5%)showing dilatation and congestion of hepatic sinusoids and binucleation of hepatocytes (H& E X400).

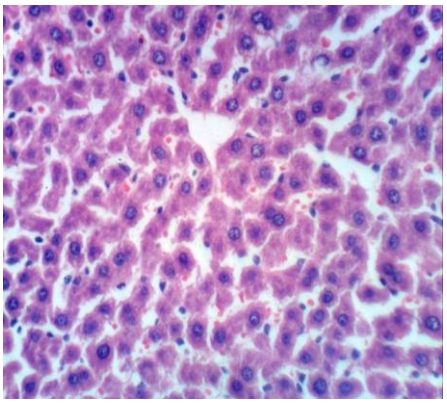


Photo (5): Liver of rats from group (4) (palm dates extract 5%) showing focal hepati necrosis associated with inflammatory cells infiltration (H & E X 400)

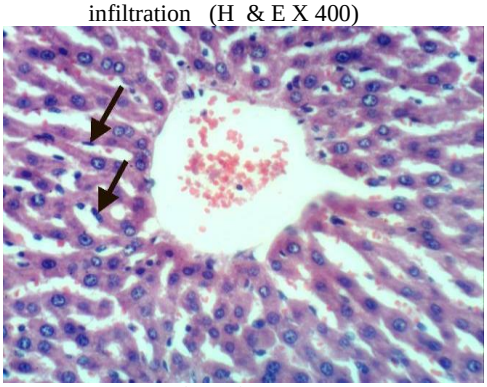


Photo (6): Liver of rats from group (4) (palm dates extract 5%) showing no histopathological Chang (H & E X 400)

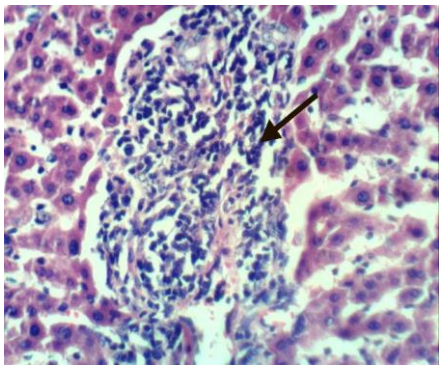


Photo (7): Liver of rats from group (5) (palm dates extract 10%) showing Kupffer cells with activation (H & E X 400)

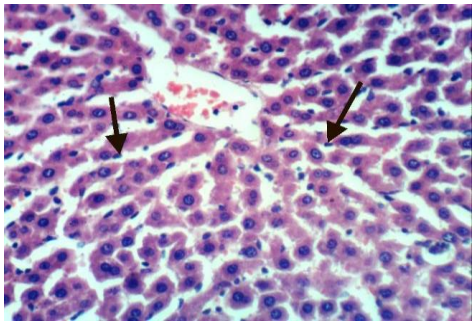


Photo (8): Liver of rats from group (6) (palm seeds extract 2.5%) showing portal infiltration inflammatory cells (H & E X 400).

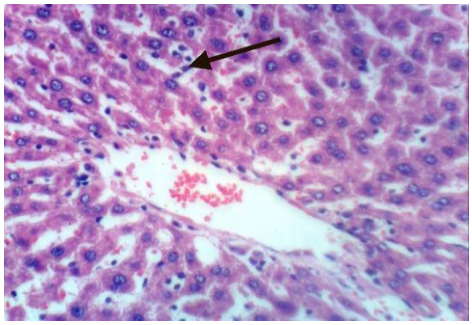


Photo (9): Liver of rat from group (6) (palm seeds seeds extract 2.5%) showing only slight Kupffer cells activation (H& E X400)

Photo (10): Liver of rats from group (7) (palm extract 5%) showing Kupffer cells activation (H & E X 400)

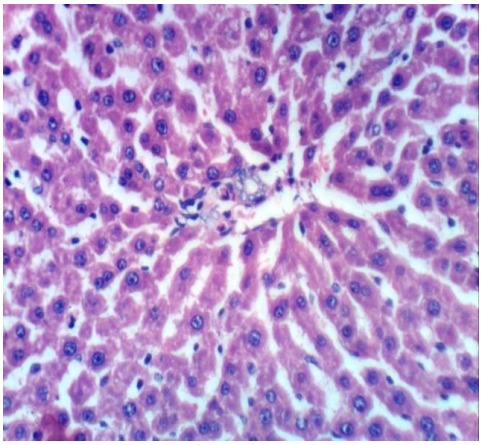
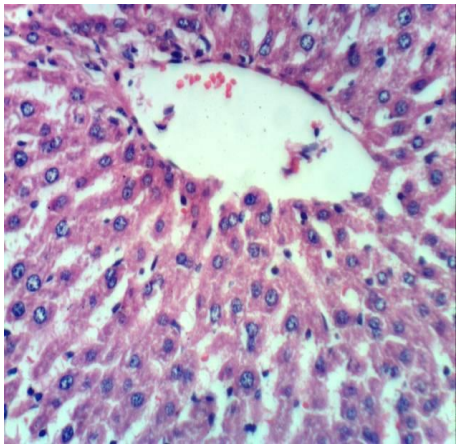


Photo (11): Liver of rats from group (7) (palm seeds extract 5%) showing no histopathologicalextract 10%) (H&EX400)



Photo(12): Liver of rats from group(8) (palm seeds showing no histopathological changes changes (H & E X 400)

Kidney:

Microscopically, Kidneys of rat from group 1 showed normal histological structure of renal parenchyma (photo. 1). Meanwhile, Kidneys of rat from group 2 revealed vacuolation of epithelial lining renal tubules, congestion of glomerular tuft and intertubular blood capillaries (photo. 2), atrophy of glomerular tuft and intertubular inflammatory cells infiltration (photo. 3). However, kidneys of rat from group 3 showed congestion of renal blood vessel (photo. 4) Meanwhile, kidney of rats from group 4 showed no histopathological changes (photo. 5). Some examined sections from group 5 showed vacuolation of endothelial lining glomerular tuft and epithelial lining renal tubules (photo. 6), whereas, other sections from this group revealed no histopathological changes (photo. 7). Moreover, kidney of rat from group 6 showed no histopathological changes (photo. 8), No histopathological changes were noticed in kidneys of rats from group 7 (photo. 9). Some examined sections from group8 showed vacuolation of endothelial lining glomerular tuft and epithelial lining renal tubules (photo 10).

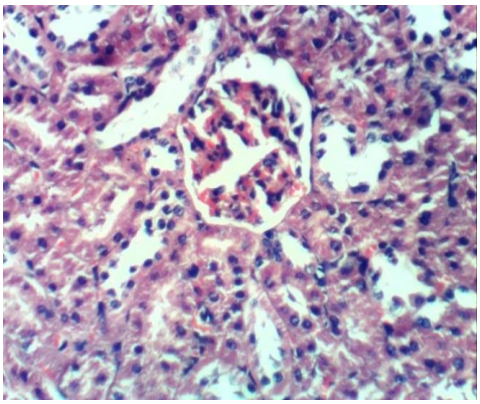


Photo (1): Kidney of rats from group (1) showing the normal histological structure of renal parenchyma (H & E X 400).

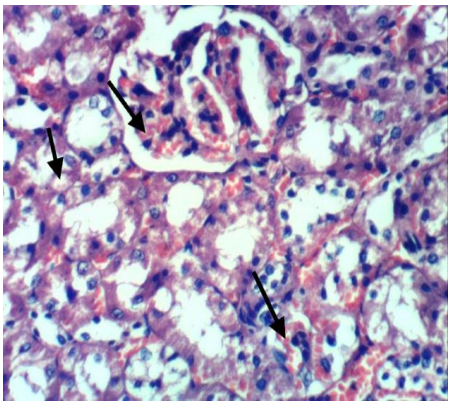


Photo (2): Kidney of rats from group (2) showing vacuolation of epithelial lining renal tubules, congestion of glomerular tuft and intertubular blood capillaries(H & E X 400).

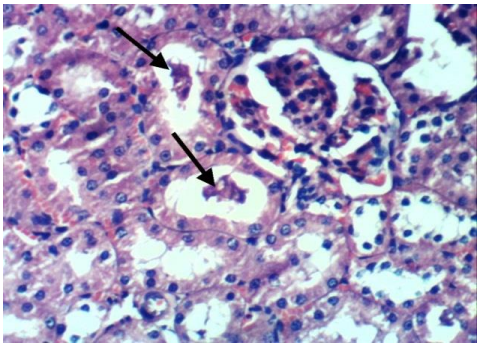


Photo (3): Kidney of rats from group (2) showing protein cast in the lumen of renal tubules (H & E X 400).

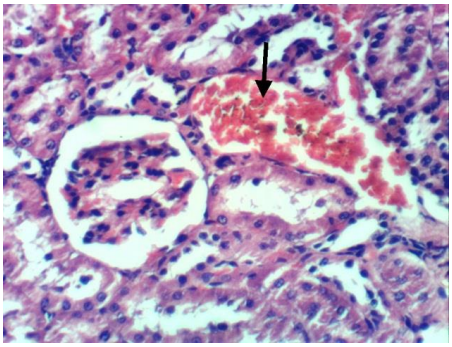


Photo (4): Kidney of rats from group (3) showing congestion of renal blood vessel (H & E X 400).

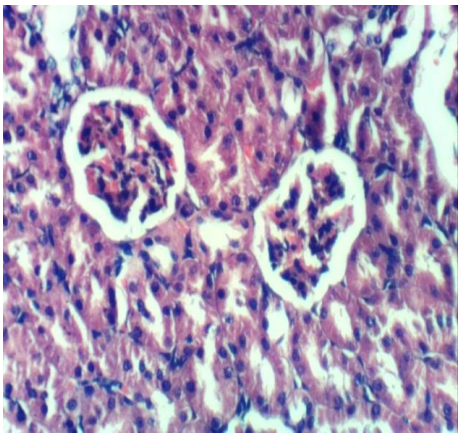


Photo (5): Kidney of rats from group (4) showing no histopathological changes (H & E X 400).

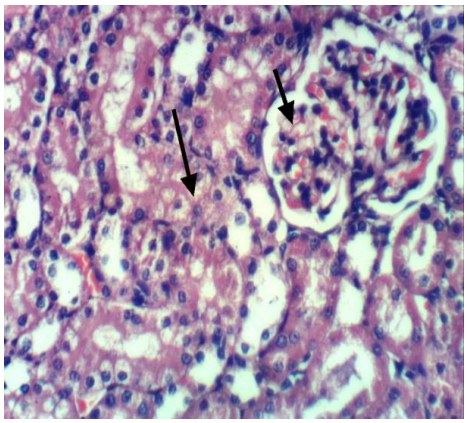


Photo (6): Kidney of rast from group (5) showing vacuolation of endothelial lining glomerular tuft and epithelial lining renal tubules (H & E X 400).

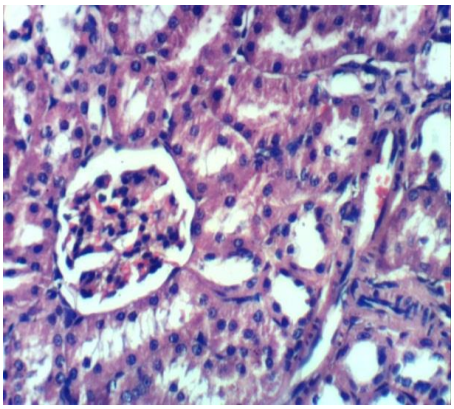


Photo (7): Kidney of rats from group (5) showing no histopathological change (H & E X 400).

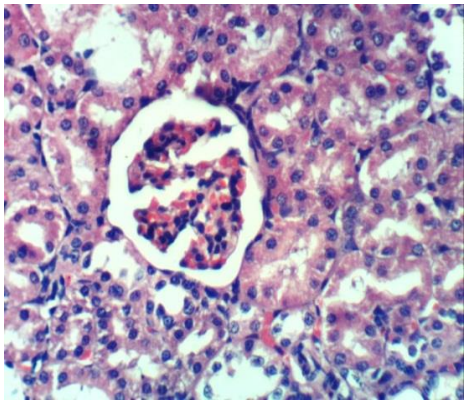


Photo (8): Kidney of rats from group (6) showing no histopathological changes (H & E X 400).

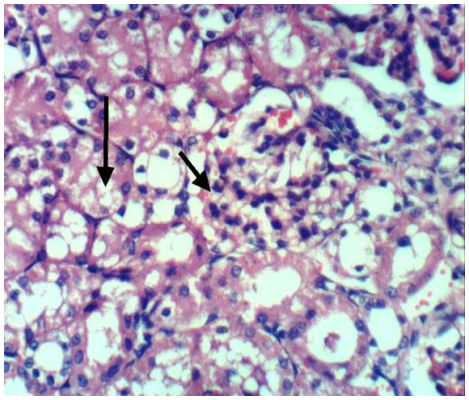


Photo (9): Kidney of rats from group (7) showing vacuolation of endothelial lining glomerular tuft andno histopathological changes(H & E X 400).

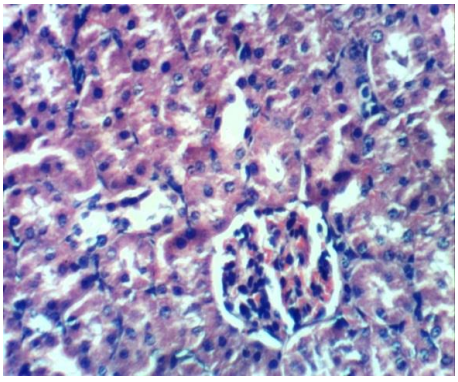


Photo (10): Kidney of rats from group (8) showing tuft andno histopathological changes(H & E X 400).

Conclusion: The tested plant parts in the present study were effective against cadmium inducated toxicity in rats . Improving in kidney functions and liver functions were These results supported our hypothesis that tested plant parts contain several free and conjugated compounds that are able to treating cadmium inducted toxicity .Therefore, we recommended the tested plant parts by a moderate amount to be included in our daily diets and drinks**.**

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دراسة التأثير العلاجي لمستخلص التمر ونوى التمر على السمية التي يسببها الكادميوم في الفئران

نهاد رشاد الطحان , شيماء المصيلحي , مها عبد المنعم حسن بدر
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الملخص العربى

تم اجراء الدراسة الحالية لمعرفة التأثير العلاجي لمستخلص التمر ونوى التمر على التسمم بالكادميوم في الفئران البيضاء. وقد اجريت الدراسة على (٤٠) فأر ألبينو من الذكور البالغة , تتراوح أ وزانهم بين ١٥٠-١٦٠ جم ,, تم تغذيتها على الوجبة الاساسية لمدة اسبوع ثم قسمت بعد ذلك الى ثمانية مجموعات متساوية ,المجموعة الاولى (المجموعة الضابطة السالبة) تم تغذيتها على الوجبة الاساسية طوال فترة التجربة ,وتم الاحتفاظ بمجموعة واحدة كمجموعة ضابطه سالبة , بينما تغذت المجموعة الثانية(المجموعة الضابطة الموجبة) على الوجبهالاساسيه مع الكادميوم عند مستوى (٥ مليجرام \التر في ماء الشرب) بهدف الاصابة بالتسمم , المجموعات (٤،٣, ٥) تم تغذية الفئران علي الوجبة الاساسيه معالكادميوم (٥ مليجرام / لتر) والمعالجة بمستخلص التمر بالنسب (٢.٥ , ٥ , ١٠ مل) على التوالي, بينما المجموعات (٨,٧,٦) تم تغذية الفئران علي الوجبة الاساسيه معالكادميوم (٥ ملغم / لتر) والمعالجة بمستخلص نوى التمر بالنسب (٢.٥ , ٥ل , ١٠ مل) على التوالي وذلك عن طريق انبوب الفم لمدة ٢٨ يوم وفى نهاية التجربة تم حساب النسبة المئوية المأخوذ اليومي والكفاءة الغذائية, ووزن الكبد والكلي ووظائف الكبد (GOT- GPT - ALP) و الكلى (اليوريا , الكرياتينين , الالبيومين) ودهون الدم (T.Ch – TG-LDL- HDL). وكذلك اجراء الفحص الهستوباثولوجى لكل من الكبد و الكلى . وقد اظهرت نتائج هذه الدراسة ان تناول مشروب مستخلص نوى التمر مستخلص التمر نتج عنه تحسن فى وظائف الكلي والكبد .

الكلمات المفتاحية :
الفحص الهيستوباثولوجي,مستخلص التمر,وظائف الكلى والكبد ,صورة دهون الدم .