

## EFFECT OF COLD AQUEOUS EXTRACT OF *FICUS CARCIA* LEAVES ON SOME BIOCHEMICAL PARAMETERS OF BLOOD AND TISSUES IN RATS

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### ABSTRACT

Different concentrations of cold aqueous extract *Ficus carica* leaves were studied on the levels of glucose, cholesterol, triglycerides, total lipids, Aspartate amino transferase (AST) and Alanine amino transferase (ALT) activity and total protein in the serum and in the liver glycogen level and total protein in the liver and heart of the normal rats. 25 male albino wistar rats derived were used, with age 3-4 month, and weight 225-300 g. The rats were divided randomly into five groups. The first group was injected with distilled water and consumed the control group. The second, third, fourth and fifth groups were injected intraperitoneally with 100, 200, 300, and 400 mg/kg B.W with aqueous extract of *Ficus carica* leaves. The blood, liver, and heart tissues were collected. The statistical results showed a significant decrease in the glucose, cholesterol, triglycerides and total lipids. While a significant increase in the Aspartate amino transferase (AST) and Alanine amino transferase (ALT) activity was showed in group 5 of both compared with the control group ( $P < 0.05$ ). In the tissues a significant reduction showed in the liver glycogen, for all concentration of the injected extract while insignificant differences were showed in the liver and heart total protein compared with the control group ( $P < 0.05$ ). It was concluded that the cold aqueous extract of *ficus carica* leaves has a biochemical role in the regulation and controlling the metabolic reaction through decreasing the glucose and lipids levels.

### INTRODUCTION

The fig tree (*Ficus Carcia*) is one of the most important fruit trees. Grows fast to 10 foot tall, tolerates summer heat and full sun. It can withstand drought conditions, and grows best in well-drained areas (Corner, 1995). *Ficus carica* contains number of natural enzymes such as B-gluconase, Cellulase, xylonase, and proteolytic enzymes (Kramer and Whitaker, 1964) its protein content showed large differences (Sorensen, 1996) and has low fat content (1-3)% of dry matter (Francesch, 1995). Its starch about (10-15) % of dry matter with amylopectin more than amylose. The fruit, often sun-dried and preserved in its own sugar, has been favourite article of food since ancient times (Flora, 1959). This fruit known as inflammatory agent (Mckey, 1989), and used to improve the growth (Nimruzi, 1998). The juice of the fruit is nutrient, demulcent and laxative, and has been much in use as gentle medicine for children. *Ficus carica* has a smooth, gray and green oval leaves (Corner, 1965), which are known for its pharmacological and nutritional properties (Slowing *et al.*, 2001). Many studies used the leaves and the fruit *Ficus carica* as a hypoglycemic (Perez *et al.*, 2003), hypocholesterolemic (Canil *et al.*, 2000) and hypotriglyceridemic agent (perez *et al.*, 1999). Because there is no local study

about the effect of *ficus carcia* , so our aim of this research is to explain the biochemical effect of the leaves aqueous extract of the local *ficus carcia* on the rats.

### MATERIALS AND METHODS

**Extract preparation:** The leaves of *Ficus carcia* were obtained from local farms in august month. 300 gm of leaves were Fractionated into small pecies, mixed with distilled water in ratio of (1:4 w/v), then the mixture was homogenated with blender for 10 min. in ice path. The process was repeated several times until the homogenization was completed. The homogenate was mixed for 1 hour in magnetic stirrer using ice bath. Then the homogenate was filtered by multiple layers of cotton, and centrifuged at 4000xg for 20-min. (Pandif *et al*,1979). The filtrate was lyophilized to 10 ml and the percentage of the solid compounds was determined.

**Animals groups:** 25 adult Albino male weanling healthy rats derived from Wister and sprague-dawley types were used, age (3-4 months) and weight (225-300 g). The rats were divided into five groups randomly , (5 rats each).The 1<sup>st</sup> group injected with distilled water and assumed the control group. 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> groups were injected intraperitoneally with the cold aqueous extract of *Ficus carcia*: in the following doses: 100, 200, 300, and 400 mg /kg B.W, respectively. Four hours after treatments, the animals were sacrificed under light anesthesia and the blood, liver, and heart tissues were collected for further studies.

**Biochemical tests:** Serum glucose, cholesterol, and triglyceride were estimated enzymatically using kit manufactured by Syrbio Company. Serum total lipid was determined using the method of Chabrol and Chardonnet (1937), AST and ALT were determined using kit manufactured by Randox company. liver, and heart total protein was determined using Biuret method (Biuret,1937), and the liver glycogen was determined using anthron method (Plumer,1978).

**Statistical analysis:** Standard statistical methods were used to determine the mean and standard deviation (S.D.). t-test was used to compare among subject result for various parameters among different groups tested with the control group (Bishop *et al.*,2005).

### RESULTS AND DISCUSSION

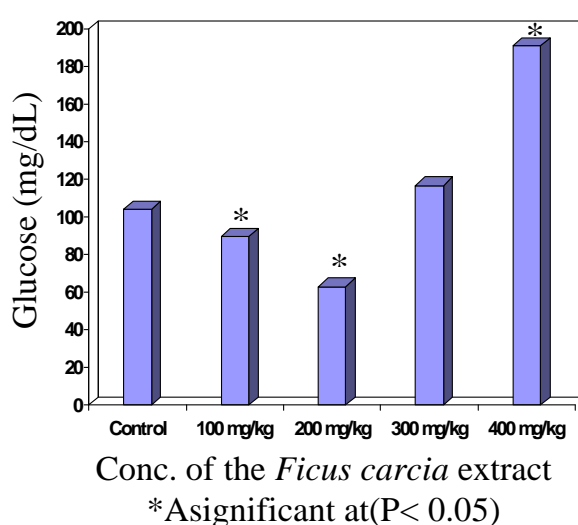
#### 1.Effect of cold aqueous extract of *Ficus carcia* Leaves on serum glucose:

The results in table (1) and fig (1) showed that serum glucose was significantly decrease in group 2 and 3 that injected with 100 and 200 mg/kg B.W of leaves extract respectively, compared with the control group (P<0.05). This result was similar to that obtained by Serraclava *et al.*(1998) who demonstrated the hypoglycemic properties of Ficus leaves in the rats also this result was similar to the results obtained by Day (1995) Torres *et al.*(1999), and Pereze *et al.*(2003), who explained the hypoglycemic effect of the *Ficus carcia* leaves extract,on the diabetic

rats. Many studies referred to some organic substances that present in the medical plants such as alkaloids , guanidine , glucodides, flavonoids polysaccharides propionic acid ( Day , 1995) that responsible for lowering

blood glucose in different ways such as stimulation of insulin secretion, or increasing the uptake of glucose by the cells ( kako *et al.*, 1995) or act as insulin by allowing the glucose enter to the cells ( Day , 1995) or by delay the glucose a bsorption form the intestine due to its high fibers contents ( Ali *et al.*, 1995) fig. (1).

The results of serum glucose showed that there was a significant increase in serum glucose in group 4 injected with 400 mg/kg B.W of the leaves extract, compared with the control group ( $P < 0.05$ ). It was suggested that the hypoglycemic effect of the leaves extract in group 2 and 3 caused a secretion of the catabolic hormones such as glucagon hormone which activate the glycogen degradation in the liver and then increase the glucose level (Murray *et al.*, 2003).



**Fig. (1):** Effect of cold aqueous extract of *Ficus carica* leaves on serum glucose.

**2.Effect of cold aqueous extract of *Ficus carica* Leaves on serum cholesterol** Results showed that serum cholesterol was significantly decreased in groups 2, 3 and 4 that injected with 100, 200, and 300 mg/kg B.W leaves aqueous extract, compared with the control group ( $P < 0.05$ ) ( Fig 2) These results were similar with that obtained by Shukla *et al.*(2004) who mentioned that the water extract of *Ficus* leaves has a significant hypocholesterolemic effect on the rabbits. Also these results were agreed with that obtained by Slowing *et al.*(2001) who explained that the *Ficus* leaves extracts decreased total plasma cholesterol and LDL and significantly increased the HDL. Also Canal *et al.* (2000) mentioned that an administration of chloroform extract obtained from *Ficus carica* leaves led to decline the total cholesterol levels and the ratio total cholesterol /HDL in the streptozotocin-induced diabetes rats .It was sugested that low cholesterol level may be occur due to the presence of the Flavonoids in the *Ficus carica* leaves which inhibit the lipoprotein oxidation ( Kirk *et al.*, 1998) and incrense HDL level in the blood by its antioxidant rule ( Gohlke , 2002 ) .Low cholesterol level may occur also due to the saponine compound which stimulate the secretion of bile acids from the liver and

hydrolyzed in the digestive system to sapognine. it was showed that sapognine form non soluble complex with the bile acid go with excereta (Sauvaire *et al.*,1991) .

**3.Effect of cold aqueous extract of *Ficus carcia* Leaves on serum triglyceride** The results of serum triglyceride in table (1) and Fig (3) showed a significant decreasing in triglyceride level in group 3,4,and 5 that injected with 200, 300, and 400 mg/kg B.W leaves extract respectively. These results were agreed with the result obtained by Perez *et al.*(1999) who stated the lipid catabolism activity of *Ficus carcia* leaves extract in the hypertriglyceridemic rats. Also, these results were agreed with the results obtained by Shukla *et al.*(2004) who mentioned that the flavonioids in the water extract of fig has a significant antioxidant effects in addition to hypolipidemic effect in the rabbits with hypercholesterolemia. Also Gruen and silverstein(2001) explained the rule of the Flavonioids in decreasing blood Lipids by stimulating the synthesis of Lipoprotein HDL which responsible for transferring the triglyceride to the liver and peripheras tissues.

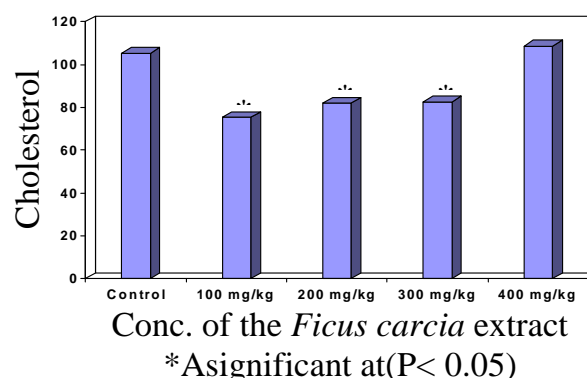


Fig. (2) :Effect of cold aqueous extract of *Ficus carcia* leaves on serum cholesterol.

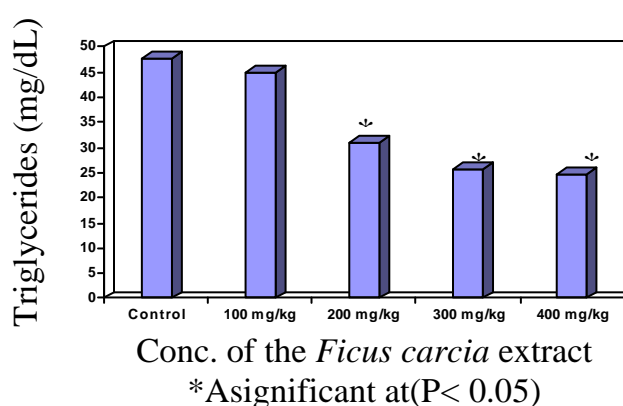


Fig.(3):Effect of cold aqueous extract of *Ficus carcia* leaves on serum triglycerides.

**4.Effect of cold aqueous extract of *Ficus carcia* Leaves on serum total lipids :** Table (1) and fig (4) showed asignificant decrease in total lipids level

in groups 3 and 4 that injected with 200 and 300 mg/kg B.W leaves extract, respectively, compared with the control group ( $p < 0.05$ ). These results may be support the reduction in the cholesterol and triglyceride mentioned above (Murray *et al.*, 2003).

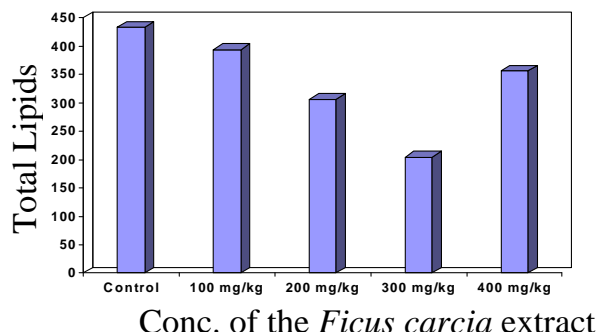
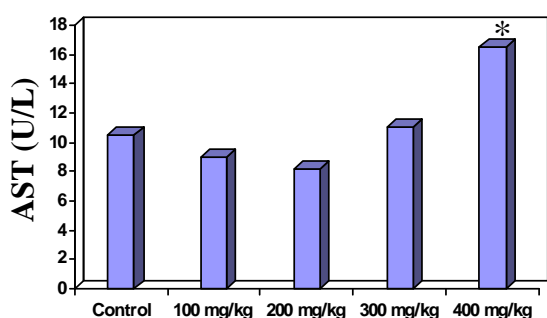


Fig. (4) :Effect of cold aqueous extract of *Ficus carica* leaves on total lipids.

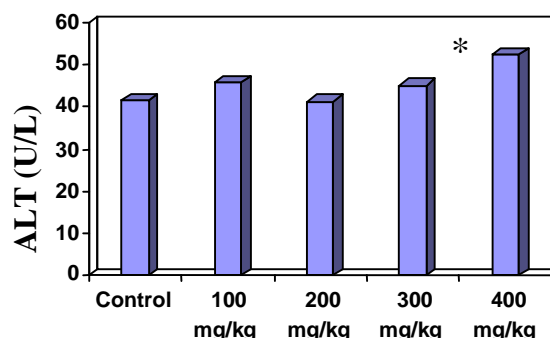
**5.Effect of cold aqueous extract of *Ficus carica* Leaves on AST and ALT activity:** The results of AST and ALT activity in table (1) showed that there was a significant increase in the activity level of AST and ALT (Fig 6) in group 5 that injected with 400 mg/kg B.W leaves extract,(Fig5) compared with the control group ( $P < 0.05$ ). There is no previous studies about the effect of *Ficus carica* leaves on AST and ALT activity but We can explained that group 5 showed a significant increase in glucose and cholesterol levels (table1), this increasing may be due to the secretion of the hormones antagonized insulin action such as glucagon as a result of highly decreased in glucose level showed in groups injected with 200 and 300 mg/kg B.W of the extract. Also the excretion of glucagon caused an increasing in the AST and ALT activity through the increasing of transamination process (Bishop *et al.*, 2005).



Conc. of the *Ficus carica* extract

\*A significant at ( $P < 0.05$ )

Fig. (5) :Effect of cold aqueous extract of *Ficus carica* leaves on AST activity.

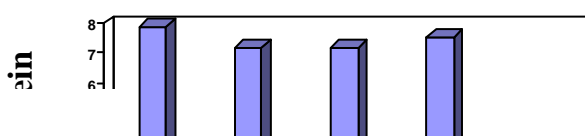


Conc. of the *Ficus carica* extract

\*Asignificant at ( $P < 0.05$ )

Fig.(6):Effect of cold aqueous extract of *Ficus carica* leaves on ALT activity.

**6.Effect of cold aqueous extract of *Ficus carica* Leaves on serum total protein:** Table (1) and (Fig7) showed asignificant decrease in the level of total protein in group 5 that injected with 400 mg/kg B.W leaves extract Because there is no previous studies, We can conclude that the secretion of glucagon hormone in group 5 caused an increasing in the protein and amino acids



metabolism.(Murray *et al.*,2003) So this result supported the increasing in AST and ALT activity showed in the same group.

Fig. (7) :Effect of cold aqueous extract of *Ficus carcia* leaves on serum total protein.

**7.Effect of cold aqueous extract of *Ficus carcia* Leaves on Liver glycogen :** Tabl , (2) showed the results of liver glycogen (Fig8) and also the results of liver and heart total protein (Fig9 and 10) . There were asignificant decreasing in the liver glycogen content in all treated groups that injected with 100, 200, 300, and 400 mg/kg B.W leaves extract ( $p < 0.05$ ). This result may refers to the high glycogen breakdown due to the low blood level of glucose (Murray *et al.*,2003). However, alterations in liver and heart total protein were not reach statistical significance, table (2).

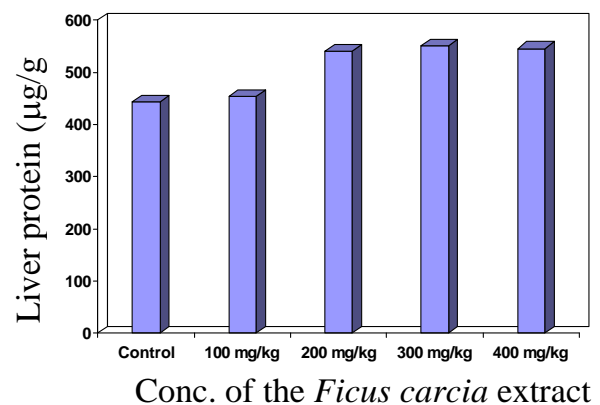
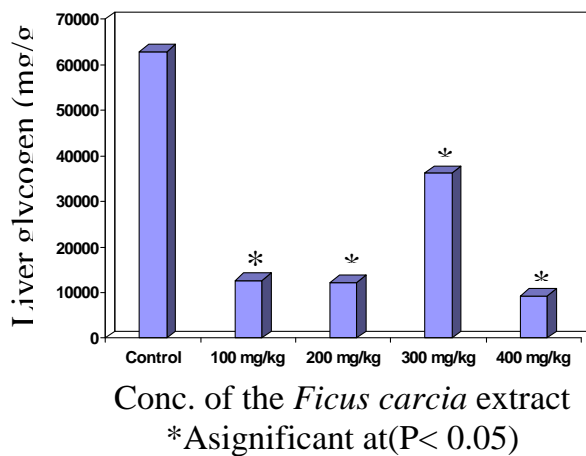
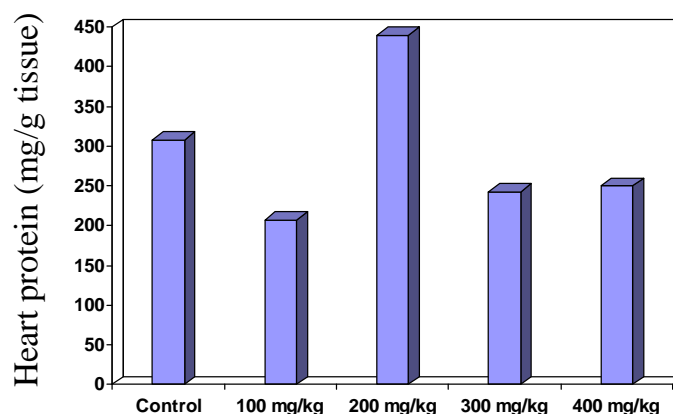


Fig. (8): Effect of cold extract of *Ficus carcia* leaves on liver glycogen.

Fig. (9): Effect of cold aqueous extract of *Ficus carcia* leaves on liver protein.



Conc. of the *Ficus carcia* extract

Fig. (10) Effect of cold aqueous extract of *Ficus carcia* leaves on heart protein: *Ficus carcia* is one of the important plants that have a nutritional action through decreasing of glucose and lipids levels. The mechanism of plants hypoglycemic action has not been clear, but it is suggest that the existence of flavonoids, sterols , and fibers in its structure may increase insulin releasing and activate insulin receptors, or may decrease the absorption of glucose and cholesterol from intestine, or increase the activity of liver lipoprotein lipase and hydrolysis of triglyceride (24).

Table (1): Effect of cold aqueous extract of *Ficus carcia* leaves on the blood properties (Mean  $\pm$  S.D)

| Groups                | Control               | G (1)<br>100mg/kg<br>BW | G (2)<br>200mg/kg<br>B.W | G (3)<br>300mg/kg<br>B.W | G (4)<br>400mg/kg<br>B.W |
|-----------------------|-----------------------|-------------------------|--------------------------|--------------------------|--------------------------|
| Glucose<br>mg/dL      | 104.05 $\pm$<br>9.00  | 89.79 $\pm$<br>6.15*    | 63.13 $\pm$<br>2.9*      | 117.08 $\pm$<br>12.18    | 191.04 $\pm$<br>22.72*   |
| Cholesterol<br>mg/dL  | 105.25 $\pm$<br>10.15 | 75.22 $\pm$<br>6.83*    | 81.97 $\pm$<br>8.10*     | 82.40 $\pm$<br>5.69*     | 108.55 $\pm$<br>29.03    |
| T.G<br>mg/dL          | 47.65 $\pm$<br>1.69   | 44.92 $\pm$ 3.48        | 30.86 $\pm$<br>5.62*     | 25.58 $\pm$<br>3.72*     | 24.69 $\pm$<br>3.69*     |
| Total lipid<br>mg/dL  | 432.63 $\pm$<br>19.95 | 393.68 $\pm$<br>42.55   | 306.03 $\pm$<br>39.79*   | 204.02 $\pm$<br>9.31*    | 355.93 $\pm$<br>42.90    |
| AST<br>U/L            | 10.54 $\pm$<br>1.75   | 9.00 $\pm$<br>0.61      | 8.16 $\pm$<br>1.05       | 10.98 $\pm$<br>3.10      | 16.5 $\pm$<br>1.59*      |
| ALT<br>U/L            | 41.57 $\pm$<br>4.36   | 45.67 $\pm$<br>3.75     | 41.26 $\pm$<br>1.35      | 45.06 $\pm$<br>2.27      | 52.42 $\pm$<br>2.33*     |
| Total<br>Protein g/dL | 7.88 $\pm$<br>0.54    | 7.20 $\pm$<br>0.187     | 7.20 $\pm$<br>0.21       | 7.52 $\pm$ 0.24          | 4.05 $\pm$<br>0.11       |

\*Asignificant at(P< 0.05)

Table (2): Effect of cold aqueous extract of *Ficus carcia* leaves on the liver and heart glycogen and total protein (Mean  $\pm$  S.D)

| Groups                           | Control                 | G (1)<br>100mg/kg<br>BW  | G (2)<br>200mg/kg<br>B.W | G (3)<br>300mg/kg<br>B.W | G (4)<br>400mg/kg<br>B.W |
|----------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Liver<br>glycogen<br>mg/g tissue | 62.80<br>$\pm$<br>1.95  | 12.736<br>$\pm$<br>3.66* | 12.229<br>$\pm$<br>4.64* | 36.165<br>$\pm$<br>2.17* | 9.335<br>$\pm$<br>0.607* |
| liver protein<br>mg/g tissue     | 0.442<br>$\pm$<br>0.041 | 0.452<br>$\pm$<br>0.060  | 0.540<br>$\pm$<br>0.036  | 0.550<br>$\pm$<br>0.066  | 0.545<br>$\pm$<br>0.077  |

|                              |                      |                     |                   |                     |                   |
|------------------------------|----------------------|---------------------|-------------------|---------------------|-------------------|
| Heart protein<br>mg/g tissue | 307.5<br>±<br>120.91 | 207.5<br>±<br>84.96 | 440<br>±<br>48.98 | 242.5<br>±<br>33.44 | 250<br>±<br>10.00 |
|------------------------------|----------------------|---------------------|-------------------|---------------------|-------------------|

\*Asignificant at(P< 0.05)

### تأثير المستخلص المائي البارد لأوراق التين في بعض الخواص الكيموحيوية للدم والأنسجة في الجرذان

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#### الخلاصة

تم دراسة تأثير تراكيز مختلفة من المستخلص المائي البارد لأوراق التين في مستويات الكلوكون والكوليسترول والكليسيريدات الثلاثية والدهون الكلية، وفعالية أنزيمات أسبارتيت أمينوترانس فريز (AST) و الانين ترانس فيريز (ALT) والبروتين الكلي في مصل الدم، وفي مستوى كلايكون الكبد والبروتين الكلي في الكبد والقلب للجرذان السليمة . استخدم في هذه الدراسة ٢٥ من ذكور الجرذان البالغة من نوع ويستر بعمر ٣-٤ أشهر ووزن تراوح بين (٢٢٥-٣٠٠) غم للحيوان الواحد . قسمت الجرذان عشوائياً إلى خمسة مجاميع متساوية، حققت المجموعة الأولى بالماء المقطر وعدت مجموعة سيطرة، أما المجاميع الثانية والثالثة والرابعة والخامسة فقد تم حقنها داخل الغشاء البريتوني بالتراكيز التالية من المستخلص المائي البارد لأوراق التين (١٠٠ و ٢٠٠ و ٣٠٠ و ٤٠٠) ملغم/كغم من وزن الجسم وجمعت أنسجة الدم والكبد والقلب . أظهرت النتائج الإحصائية وجود انخفاض معنوي في مستوى الكلوكون والكوليسترول والكليسيريدات الثلاثية والدهون الكلية لاغلب التراكيز المحقونة من المستخلص، في حين لوحظ ارتفاع معنوي في فعالية أنزيمات ALT و AST للمجموعة الخامسة مقارنة مع مجموعة السيطرة (P<0.05). وفي الأنسجة لوحظ انخفاض في مستوى كلايكون الكبد لجميع التراكيز المحقونة من المستخلص في حين لم يلحظ وجود فرق محسوس في مستوى البروتين الكلي في الكبد والقلب مقارنة مع مجموعة السيطرة. نستنتج من ذلك أن المستخلص المائي البارد لأوراق التين له دور حيوي في التنظيم والسيطرة على العمليات الأيضية من خلال خفض مستويات الكلوكون والمواد الدهنية.

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