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Protective Effect of Fig, Sycamore and their Mixture on Kidney Disorder in Gentamicin-Induced Rats

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Abstract

The protective effect of different concentrations 2.5 and 5 % of fig (*Ficus carica, L.*), sycamore (*Ficus sycomorus, L.*) and their mixture as powder on gentamicin-induced nephrotoxicity and to elucidate the potential mechanism male rats was investigation. Forty eight male albino rats weighing 150±10 g were used, and divided into 8 equal groups, first one was kept as a negative (-ve) control group, while the other 7 groups were injected by gentamicin at the dose of 10mg/kg body weight for 10 consecutive days. The obtained results concluded that the best treatment of urea, uric acid and creatinine was recorded for rats fed on 5% mixture fruits as compared to positive control group. The lowest liver enzymes (ALP, ALT and AST) recorded for group fed on 5% mixture fruits as powder as compared to positive control group. All nephrotoxic rats fed on different diets revealed significant decreases in total cholesterol, triglyceride LDL-c and VLDL-c with the mean values as compared to positive control group. While, all nephrotoxic rats fed on different diets revealed significant increase in HDL-c with the mean values as compared to positive control group. As conclusion, the rats fed with mixture fig and sycamore as powder improving the kidney functions, liver functions and lipid profile.

Key Words: Fig and sycamore fruits, Nephrotoxicity, Rats, Biochemical analysis.

Introduction

The kidney plays a vital role in the maintenance of normal blood volume/pressure and the regulation of acid -base balance. Approximately one - fourth of the cardiac out is filtered through the kidney. The kidneys also play a great role in urine excretion as they are the path way for removal of the waste products of absorption and metabolism. Which include ammonia, urea, creatinine, phosphorus, water, sodium and potassium, the kidney produces erythropoietin hormone, deficiency of this hormone results in profound anemia. A decrease in kidney functions greatly affects metabolism and nutritional status **(Miller and Klahr, 2005)**.

The kidneys are two bean-shaped organs found in vertebrates. They are located on the left and right in the retroperitoneal space, and in adult humans are about 11 centimeters (4.3 in) in length. They receive blood from the paired renal arteries; blood exits into the paired renal veins. Each kidney is attached to a ureter, a tube that carries excreted urine to the bladder **(Glodny *et al.*, 2009)**.

Raghavendra *et al*., (2013) reported that the kidneys are organs that serve several essential regulatory roles in adult humans, including vertebrates and some invertebrates. They are essential in the urinary system and also serve homeostatic functions such as the regulation of electrolytes, maintenance of acid–base balance, and regulation of blood pressure (via maintaining salt and water balance). They serve the body as a natural filter of the blood, and remove wastes which are diverted to the urinary bladder.

The kidneys excrete a variety of waste products produced by metabolism into the urine. The microscopic structural and functional unit of the kidney is the nephron. It processes the blood supplied to it via filtration, reabsorption, secretion and excretion; the consequence of those processes is the production of urine. These include the nitrogenous wastes urea, from protein catabolism, and uric acid, from nucleic acid metabolism. The ability of mammals to concentrate wastes into a volume of urine much smaller than the volume of blood from which the wastes were extracted is dependent on an elaborate countercurrent multiplication mechanism **(Thomas, 2005)**.

According to 9^{th} Annual Report of The Egyptian Renal Registry provided by Egyptian Society of Nephrology and Transplantation (ESNT), prevalence of ESRD in Egypt raised to 483 patients per million.

Mean age is about 49.8 ± 19 years. Males represented 55.2 % while females were about 44.8 % as reported by **(El-Ballat *et al.*, 2019).**

Gentamicin (GM), an aminoglycoside, is known for its nephrotoxicity and one of the possible mechanisms suggested is damage due to generation of free radicals. GM induces a dose-dependent nephrotoxicity in 10–25% of therapeutic courses**.** There are reports which suggest the role of ROS/Nitrogen species, in association with increased lipid peroxide formation and decreased activity of antioxidant enzymes in GM-induced nephrotoxicity **(Ali *et al.*, 2011).**

Fig (*F. carica*) is generally known as it is a small deciduous tree native to Asia Minor, Persia, Syria and the Mediterranean region. Fig is a member of *Moraceae* family which covers one of the chief genera of angiosperms with approximately 800 species of trees, shrubs, hemiepiphytes, climbers, and creepers in the tropics and subtropics **(Anonymous, 2002)**.

Ficus carica was emollient, demulcent, cooling, laxative and nutritive. The edible fruits of *Ficus carica* were traditionally used for treatment of hemorrhoids, insect stings, gout, ulcers, and skin infections such as warts and viruses. Fruits were usually recommended for people suffering from constipation, nutrient for pregnant women and for mental and physical exhaustion. They were considered as antipyretic, tonic, purgative, alexiteric, aphrodisiac, lithontriptic, anti-inflammatory, expectorant, diuretic, and used for treatment of pharyngitis, gastritis, bronchitis, irritative cough, weakness, paralysis, thirst, diseases of the liver and spleen, pain in the chest, to cures piles, to stimulate growth of hair, and for leprosy and nose bleeding **(Park *et al.*, 2013)**.

Both fresh and dried figs have high amounts of fiber and polyphenols. Figs are found to be a rich source of amino acids. They are also free of fat and cholesterol. As per USDA data for the Mission variety of figs, dried figs are an excellent source of fiber, Vitamin K and minerals like copper, manganese, magnesium, potassium, calcium relative to human needs **(Slatnar *et al*., 2011)**.

Ficus carica fruit extract caused marked reduction in serum urea and creatinine levels in gentamicin induced nephrotoxicity; these findings are indicative of antioxidant properties of *Ficus carica* which are mainly due to flavonoids and phenolic compounds **(Kore *et al.*, 2011)**.

Ficus sycomorus, L. (*F. Moraceae*) is grown in Egypt and called sycamore or gimmeiz. The fruit is edible and the different parts of the plant are used in various African countries for the treatment of many diseases and disorders such as diarrhea, dysentery, skin infections, stomach disorders, liver diseases, jaundice, chest conditions, cough and scrofula, tuberculosis, inflammations, throat pain, fungal diseases, epilepsy, lactation disorders, helminthiasis, mental disorders, sickle cell disease, infertility and sterility **(Gbokwe *et al.*, 2009)**.

Most of sycamore (*Ficus sycamorus*) fruits are consumed by local communities and just a little part of it is sold on the markets. The sycamore provides water, vitamins, carbohydrates, minerals and pigments that are required in the diet as reported by **(FAO, 2010)**.

Ramde -Tiendrebeogo *et al.,* (2012) found that the highest content in total phenolics and tannins and the best anti-free radical activity were obtained with sycamore.

Ficus fruits have nephroprotective activity; these effects of hydroalcoholic extract of *Ficus* may be due to presence of phytochemicals like flavonoids also its ability of anti-inflammatory activity and antioxidant status which may act individually or synergistically **(Kore *et al.*, 2011)**.

This work was conducted to study the effect of different concentrations of fig and sycamore fruits as powder on biological and biochemical changes of kidney disorder rats.

Material & Methods

Materials

Fig (*Ficus carica, L.*) and sycamore (*Ficus sycamorus*) fruits were obtained from local market in 2019 from Sheben El-Kom City, Menoufia Governorate, Egypt.

Experimental animals

A total of 48 adult normal male albino rats Sprague Dawley strain weighing 150±10 g were obtained from Vaccine and Immunity Organization, Ministry of Health, Helwan Farm, Cairo, Egypt.

Gentamicin

Gentamicin (GM) (aminoglycosides antibiotics) obtained from Memphis Co. form Pharm. Chem. Ind., Cairo, Egypt.

The chemical kits

Chemical kits used for determination the (TC, TG, HDL-c, ALT, AST, ALP, urea, creatinine and uric acid) were obtained from Al-Gomhoria for Drug, Chemicals, Medicals, Instruments Company, Cairo, Egypt.

Methods

Preparations of fig and sycamore fruits

To prepare the dried fig and sycamore fruits were obtained from local market, then fruits were washed thoroughly under running tap water, dried at air oven at 45°C, and ground to a fine powder using an air mill (Molunix, Al-Araby, company, Egypt).

Induction of kidney damage:

Kidney damage was induced in rats by administrating gentamicin (GM) (aminoglycosides antibiotics) obtained from Memphis Co. form Pharm. Chem. Ind., Cairo., A.R.E. intraperitonially at the dose of 10mg/kg body weight for 10 consecutive days **(Yaman and Balikci, 2010)**.

Experimental design:

Forty eight adult male white albino rats, Sprague Dawley Strain, 10 weeks age, weighing (150±10g) were used in this experiment. All rats were fed on basal diet prepared according to **American Institute of Nutrition (AIN) (1993)** for 7 consecutive days. After this adaptation period, rats are divided into 8 groups, each group which consists of 6 rats as follows:

Group (1): Rats will feed on basal diet as a control negative.

Group (2): A group injected intraperitoneally with (aminoglycosides antibiotics) Garamycin (10 mg/kg) every 24 hr. for 10 days to induce Nephrotoxicity, one of the adverse reaction takes place and used as a positive control group.

Group (3): A group infected kidney disorder was fed on fig fruits as powder by 2.5% of the weight of the diet.

Group (4): A group infected kidney disorder was fed on fig fruits as powder by 5% of the weight of the diet.

Group (5): A group infected kidney disorder was fed on the sycamore fruits as powder by 2.5% of the weight of the diet.

Group (6): A group infected kidney disorder was fed on the sycamore fruits as powder by 5% of the weight of the diet.

Group (7): A group infected kidney disorder was fed on the mixture of fruits as powder by 2.5% of the weight of the diet.

Group (8): A group infected kidney disorder was fed on the mixture of fruits as powder by 5% of the weight of the diet.

The experiment taken 28 days, at the end of the experimental period each rat weight separately then, rats were slaughtered and collected blood samples. Blood samples were centrifuged at (4000 rpm) for ten minute to separate blood serum, then kept in deep freezer till using extracting the liver, spleen and kidney.

Blood sampling

After fasting for 12 hours, blood samples in initial times were obtained from retro orbital vein, while it obtained from hepatic portal vein at the end of each experiment. Blood samples were collected into a dry clean centrifuge glass tubes and left to clot in water bath (37°C) for 30 minutes, then centrifuged for 10 minutes at 4000 rpm to separate the serum, which were carefully aspirated and transferred into clean cuvette tube and stored frozen in deep freezer till analysis.

Biochemical analysis

Kidney functions

Determination of serum urea, uric acid and creatinine

Serum urea, uric acid and serum creatinine were determined by enzymatic method according to **Patton and Crouch (1977); Barham and trinder (1972)** and **Henry (1974**), respectively.

Determination of blood glucose

Enzymatic determination of serum glucose was carried out calorimetrically according to the method of **Tinder (1969).**

Liver functions

Determination of serum alanine aminotransferase (ALT), serum asparatate aminotransferase (AST), serum alkaline phosphatase (ALP) were carried out according to the method of **Clinica Chimica Acta (1980)**, **Hafkenscheid (1979) and Moss (1982**),respectively.

Lipids profile:

Serum total cholesterol was determined according to the colorimetric method described by **Thomas (1992)**.

Determination of serum triglycerides

Serum triglyceride was determined by enzymatic method using kits according to the **Young (1975) and Fassati & Prencipe, (1982)**.

Determination of high density lipoprotein cholesterol (HDL-c):

HDL-c was determined according to the method described by **Grodon and Amer (1977)**.

Calculation of very low density lipoprotein cholesterol (VLDL-c):

VLDL-c was calculated in mg/dl according to **Lee and Nieman (1996)** using the following formula: **VLDL-c (mg/dl) = Triglycerides / 5**

Calculation of low density lipoprotein cholesterol (LDL-c)

LDL-c was calculated in mg/dl according to **Lee and Nieman (1996)** as follows:

LDL-c (mg/dl) = Total cholesterol – HDL-c – VLDL-c

Statistical analysis

The data were analyzed using a completely randomized factorial design **SAS (1988)** when a significant main effect was detected; the means were separated with the Student-Newman-Keuls Test. Differences between treatments of ($P \leq 0.05$) were considered significant using SPSS program. Biological results were analyzed by One Way ANOVA.

Results and discussion

Effect of fig, sycamore fruits and their mixture on kidney functions of nephrotoxic rats:

Data tabulated in Table (1) show the effect of fig, sycamore fruits and their mixture as powders on kidney functions (serum urea, serum uric acid and serum creatinine), levels of nephrotoxic rats. The obtained results indicated that the higher serum urea levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 34.40 and 17.00 mg/dl, respectively.

On the other hand, the highest serum urea levels of treated groups (nephrotoxic groups) recorded for 5% sycamore, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 31.60 and 18.70 mg/dl, respectively.

The obtained results showed that the higher serum uric acid levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 3.50 and 1.82 mg/dl, respectively.

On the other hand, the highest serum uric acid levels of treated groups (nephrotoxic groups) recorded for 2.5% sycamore fruit, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 3.28 and 2.08 mg/dl, respectively.

The obtained results indicated that the higher serum creatinine levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 0.89 and 0.57 mg/dl, respectively.

On the other hand, the highest serum creatinine levels of treated groups (nephrotoxic groups) recorded for 2.5% sycamore, while the lowest value recorded for 5% mixture with significant differences. The mean values were 0.76 and 0.56 mg/dl, respectively. These results are in agreements with **Ali, (1995),** who mentioned that the kidney is a common target for toxic xenobiotics, due to its capacity to extract and concentrate toxic substances, and to its large blood flow share (about

20% of cardiac output). Development of nephrotoxicity can further increase load on the kidney leading to serious complications.

Also, **Hasanin *et al.*, (2018)**, they reported that the highest serum creatinine levels of treated groups recorded for 5% figs fruits, while the lowest valuerecorded for 5% mixture with significant differences. The antioxidant power and fiber content of figs and its leaves are the bases for contribution of these actions.

Effect of fig, sycamore fruits and their mixture on glucose level of nephrotoxic rats:

The effect of fig and sycamore on glucose level of nephrotoxic rats are shown in Table (2). It is clear to notice that the higher glucose level (mg/dl) recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 178.0 and 101.0 mg/dl, respectively.

All nephrotoxic rats fed on fig and sycamore showed significant differences in mean values as compared to positive control group. The highest glucose level recorded for group rats fed on 2.5% sycamore fruit, while the lowest value recorded for 5% mixture fruits with significant differences between them. The best glucose level (mg/dl) was recorded for group (8) (nephrotoxic rats fed on basal diet and 5% mixture) when compared with negative control group. These results are in agreement with **Ahmad *et al.*, (2003)**, they reported that anti-diabetic effect of methanolic extract of fruits was carried out and finding confirmed that extract showed significant protection and lowered the blood glucose levels to normal.

Effect of fig, sycamore fruits and their mixture on liver functions of nephrotoxic rats:

Data given in Table (3) showed the effect of fig, sycamore fruits and their mixture as powders on liver functions levels (ALT, AST and ALP) of nephrotoxic rats. It is clear to mention that the higher ALT liver enzyme levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 70.40 and 25.20 U/L, respectively.

On the other hand, the highest ALT liver enzyme of treated groups (nephrotoxic groups) recorded for 2.5 % sycamore fruits, while the lowest value recorded for 5% mixture fruits with a significant difference. The mean values were 64.40 and 30.90 U/L, respectively.

In case of AST liver enzyme, the higher levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 75.60 and 27.27 U/L, respectively.

On the other hand, the highest AST liver enzyme of treated groups (nephrotoxic groups) recorded for 2.5 % sycamore fruits, while the lowest value recorded for 5% mixture fruits with significant differences. The mean values were 66.00 and 40.80 U/L, respectively.

In case of ALP liver enzyme, the higher levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 90.56 and 69.10 U/L, respectively.

On the other hand, the highest ALP liver enzyme of treated groups (nephrotoxic groups) recorded for 2.5 % sycamore fruits, while the lowest value recorded for 5% mixture with a significant difference. The mean values were 84.20 and 71.11 U/L, respectively. Our results agreed with that of **Samia *et al.*, (2015)**, who reported that the hepatoprotective properties of wood, leaf, unripe fruit and root extract of *F. sycomorus* using N-nitrosodiethylamine and carbon tetrachloride induced hepatocarcinogenesis in rats revealed that the leaf and wood extracts produced remarkable hepatoprotective activities at 400 mg/kg while the stem bark and fruit extract produced moderate and no significant activities respectively.

Effect of fig, sycamore fruits and their mixture on total cholesterol and serum triglycerides levels of nephrotoxic rats:

Data presented in Table (4) showed the effects of fig, sycamore fruits and their mixture as powders on serum total cholesterol and serum triglycerides levels of nephrotoxic rats.

The obtained results indicated that the higher serum total cholesterol levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 195.50 and 86.00 mg/dl, respectively.

On the other hand, the highest serum total cholesterol levels of treated groups (nephrotoxic groups) recorded for 2.5% sycamore fruits, while the lowest value recorded for 5 % mixture fruits with a significant difference. The mean values were 166.50 and 105.00 mg/dl, respectively.

In case of serum triglycerides levels, it could be concluded that the higher serum total cholesterol levels recorded for positive control group, while negative control group recorded the lower value with significant differences. The mean values were 180.50 and 75.00 mg/dl, respectively.

On the other hand, the highest serum triglycerides levels of treated groups (nephrotoxic groups) recorded for 2.5% sycamore fruits, while the lowest value recorded for 5 % mixture fruits with a significant difference. The mean values were 145.0 and 89.50 mg/dl, respectively. These results are in agreement with **Torres-Duran *et al*., (1998)** they reported that levels of TG and TC in the liver also have been estimated to explain the status of liver. High level of TG and TC in the liver is the indication of the liver injury.

Mahmoud *et al*., (2013) concluded that supplementing the hypercholestrolemic diet with either fig or sycamore can exert a hypocholesterolemic effect in rats which was attributed to the potent antioxidant power of these fruits. Consequently, consuming large quantities from these fruits is believed to lower the serum cholesterol levels thus protecting against cardiovascular diseases. Moreover, it can be used in those patients with atherosclerosis as adjuvant therapy.

Effect of fig, sycamore fruits and their mixture on lipid profile levels of nephrotoxic rats:

Data presented in Table (5) showed the effects of fig, sycamore fruits and their mixture as powders on serum lipid profile (high density lipoprotein cholesterol (HDL-c), low density lipoprotein cholesterol (LDL-c) and very low density lipoprotein cholesterol (VLDL-c), levels of nephrotoxic rats. The obtained results indicated that the higher high density lipoprotein cholesterol levels recorded for negative control group, while positive control group recorded the lower value with a significant difference. The mean values were 54.00 and 31.00 mg/dl, respectively.

On the other hand, the highest high density lipoprotein cholesterol levels of treated groups (nephrotoxic groups) recorded for 5% mixture, while the lowest value recorded for 2.5% sycamore fruit with a significant difference. The mean values were 51.40 and 44.80 mg/dl, respectively.

Data also indicated that the higher low density lipoprotein cholesterol levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 128.00 and 17.00 mg/dl, respectively.

On the other hand, the highest low density lipoprotein cholesterol levels of treated groups (nephrotoxic groups) recorded for 2.5% sycamore fruit, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 92.70 and 35.70 mg/dl, respectively.

In case of very low density lipoprotein cholesterol levels, it could be concluded that the higher VLDL-c levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 36.10 and 15.00 mg/dl, respectively.

On the other hand, the highest low density lipoprotein cholesterol (VLDL-c) levels of treated groups (nephrotoxic groups) recorded for 2.5% sycamore fruit, while the lowest value recorded for 5 % mixture with significant differences. The mean values were 29.00 and 17.90 mg/dl, respectively. These results are in agreement with **Kumar,** (**2015**), they reported that fruits contain many antioxidants compounds such as carotenoids and flavonoids can help reduce the oxidation of LDL-c cholesterol which could lead to damaged artery walls and ultimately heart attacks and strokes.

Mahmoud *et al.*, (2013) revealed that the positive control group showed a significant increase in TC, TG, LDL-c, VLDL-c and atherogenic index (LDL-c/HDL-c), while there was a significant decrease in the concentration of serum HDL-c.

Table (1): Effect of fig, sycamore and their mixture as powder on kidney functions of nephrotoxic rats

Parameters / Groups	Urea (mg/dl)	Uric acid (mg/dl)	Creatinine (mg/dl)
	Mean ± SD	**Mean ± SD**	**Mean ± SD**
Group1(negative control)	$17.00^{f}±1.58$	$1.82^{f}±0.83$	$0.57^{d}±0.04$
Group 2 (positive control)	$34.40^{a}±2.07$	$3.50^{a}±0.15$	$0.89^{a}±0.13$
Group3 (2.5% Sycamore)	$29.80^{c}±1.48$	$3.28^{b}±0.20$	$0.76^{b}±0.07$
Group 4 (5% Sycamore)	$31.60^{b}±3.04$	$3.20^{c}±0.08$	$0.70^{c}±0.08$
Group5 (2.5% Fig)	$25.20^{d}±2.77$	$2.56^{d}±0.11$	$0.69^{c}±0.03$
Group 6 (5% Fig)	$20.20^{e}±3.03$	$2.20^{e}±0.16$	$0.64^{e}±0.10$
Group 7 (2.5% Mixture)	$23.70^{d}±3.51$	$2.39^{d}±0.14$	$0.59^{d}±0.05$
Group 8 (5% Mixture)	$18.70^{e}±1.12$	$2.08^{e}±0.14$	$0.56^{d}±0.20$
LSD (P ≤ 0.05)	**1.58**	**0.181**	**0.028**

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (p ≤0.0

Table (2): Effect of fig, sycamore and their mixture as powder on glucose level of nephrotoxic rats

Parameters / Groups	Glucose level (mg/dl)
Group1(negative control)	101.0^{g}±0.12
Group 2 (positive control)	178.0^{a}±0.16
Group3 (2.5% Sycamore)	152.0^{b}±0.13
Group 4 (5% Sycamore)	143.0^{d}±0.14
Group5 (2.5% Fig)	148.0^{c}±0.10
Group 6 (5% Fig)	137.0^{e}±0.11
Group 7 (2.5% Mixture)	136.0^{e}±0.12
Group 8 (5% Mixture)	123.0^{f}±0.15
LSD (P ≤ 0.05)	**3.548**

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).

Table (3): Effect of fig, sycamore fruits and their mixture powder on liver functions (ALT, AST and ALP) of obese rats

Parameters / Groups	ALT(U/L)	AST(U/L)	ALP(U/L)
	Mean ±SD	**Mean ±SD**	**Mean ±SD**
Group1(negative control)	25.20^{f}±1.40	27.27^{f}±1.50	69.10^{e}±1.30
Group 2 (positive control)	70.40^{a}±2.31	75.60^{a}±1.20	90.56^{a}±1.14
Group3 (2.5% Sycamore)	64.40^{b}±2.16	66.00^{b}±2.40	84.20^{b}±1.12
Group 4 (5% Sycamore)	55.80^{c}±4.10	61.00^{b}±2.12	82.85^{b}±1.50
Group5 (2.5% Fig)	45.60^{d}±3.25	55.00^{d}±1.40	78.00^{c}±2.32
Group 6 (5% Fig)	32.40^{e}±3.30	42.60^{e}±2.40	73.04^{d}±1.41
Group 7 (2.5% Mixture)	43.90^{d}±1.05	53.80 ^{d}±1.20	76.00^{c}±1.20
Group 8 (5% Mixture)	30.90^{e}±2.10	40.80^{e}±2.10	71.11^{de}±1.10
LSD (P ≤ 0.05)	**3.57**	**4.10**	**2.28**

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (P ≤0.05).

Table (4): Effect of fig, sycamore fruits and their mixture powder on total cholesterol and triglycerides of nephrotoxic rats

Parameters / Groups	Total cholesterol (mg/dl)	Triglycerides (mg/dl)
Group1(negative control)	86.00^{f}±2.44	75.00^{f}±2.25
Group 2 (positive control)	195.50^{a}±1.31	180.50^{a}±3.00
Group3 (2.5% Sycamore)	166.50^{b}±4.32	145.00^{b}±13.24
Group 4 (5% Sycamore)	149.50^{c}±3.20	112.00^{c}±1.60
Group5 (2.5% Fig)	125.50^{d}±5.45	95.00^{d}±5.24
Group 6 (5% Fig)	109.50^{e}±4.16	91.00^{e}±2.00
Group 7 (2.5% Mixture)	121.50^{d}±5.75	92.50^{e}±5.22
Group 8 (5% Mixture)	105.00^{e}±2.10	89.50^{e}±2.07
LSD (P ≤ 0.05)	**3.980**	**2.750**

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (p ≤0.05).

Table (5): Effect of fig, sycamore fruits and their mixture powder on lipid profile of nephrotoxic rats

Parameters / Groups	HDL-c (mg/dl)	LDL-c (mg/dl)	VLDL-c (mg/dl)
	Mean ± SD	**Mean ± SD**	**Mean ± SD**
Group1(negative control)	54.00^{a}±2.10	17.00^{f}±4.51	15.00^{e}±0.71
Group 2 (positive control)	31.00^{d}±2.14	128.40^{a}±3.35	36.10^{a}±0.63
Group3 (2.5% Sycamore)	44.80^{c}±3.50	92.70^{d}±2.28	29.00^{d}±1.06
Group 4 (5% Sycamore)	46.20^{c}±1.50	80.90^{e}±3.87	22.40^{d}±0.53
Group5 (2.5% Fig)	46.80^{c}±2.30	59.70^{c}±3.39	19.00^{c}±0.80
Group 6 (5% Fig)	50.40^{b}±2.42	40.90^{b}±5.17	18.20^{b}±2.60
Group 7 (2.5% Mixture)	46.91^{c}±2.70	56.09^{d}±2.16	18.50^{d}±0.22
Group 8 (5% Mixture)	51.40^{b}±2.34	35.70^{e}±4.25	17.90^{d}±0.31
LSD (P ≤ 0.05)	**3.160**	**3.890**	**1.920**

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (p ≤0.05).

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التأثير الحافظ لثمار التين والجميز فى الفئران المصابة بخلل فى الكلى بواسطة الجنتاميسين

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الملخص العربى

تم فى هذا البحث دراسه التأثير الوقائى لثمار التين والجميز ومخلوطهما فى صوره مسحوق بتركيز 2,5% ، 5% على الخلل الحادث فى الكلى لذكور الفئران المعالجه بالجنتاميسين. حيث استخدم 48 فأر في هذه الدراسة يتراوح وزن كل منها 150±10 جرام وتم تقسيمها إلى8 مجموعات متساويه ، كل مجموعة تحتوي على 6 الفئران. تركت المجموعه الاولى كمجموعه ضابطه سالبه ، اما المجموعات السابعة الأخرى فتم حقنها بواسطه الجنتامسين بجرعة 10 مجم /كجم من وزن الجسم لمدة 10 أيام يوميا. وفى نهايه التجربه تم قياس أنزيمات الكبد فى الدم ومستوى السكر، وظائف الكلى، الكوليسترول الكلى، الدهون الثلاثيه وصورة دهون الدم (HDL-c, LDL-c VLDL-c). كانت أهم النتائج المتحصل عليها أن .وسجلت أفضل نتيجة من اليوريا وحمض اليوريك والكرياتينين عن الفئران التي تغذت على تركيز 5% من مخلوط ثمار التين والجميز بالمقارنة مع المجموعة الظابطة الموجبة. أقل قيم فى انزيمات الكبد المختلفة (ALP، ALT, AST) سجلت مع مجموعة الفئران التى تغذت على مخلوط ثمار التين والجميز بتركيز 5٪ على شكل مسحوق بالمقارنة مع مجموعة الظابطة الموجبة. واظهرت الدراسة أن الفئران التى تغذت على وجبات مختلفة من مخلوط ثمار التين والجميز حدث لها انخفاض كبير في نسبة الكولسترول الكلي والدهون الثلاثية والكوليستيرول منخفض الكثافة (LDL-c) والكوليستيرول منخفض الكثافة جدا (VLDL-c) بالمقارنة مع مجموعة الظابطة الموجبة. بينما حدث ارتفاع كبير فى قيم الكوليستيرول مرتفع الكثافة (HDL-c) للفئران التى تغذت على وجبات مختلفة من ثمار التين والجميز بالمقارنة مع مجموعة الظابطة الموجبة. ويستنتج من هذه الدراسة أن تغذية الفئران على مخلوط ثمار التين والجميز خاصا بنسبة 5% أدى إلى تحسين وظائف الكلى والكبد وانخفاض مستوى دهون الدم.

الكلمات المفتاحيه : ثمار التين والجميز ، أمراض الكلى ، الفئران ، التحاليل الكيميائية الحيوية .