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Effect Of Christ's Thorn (*Ziziphus Spina- Christi*) And Tiger Nut (*Cyperusesculentus*) Fruitson Liver Disorder In Carbon Tetrachloride Induced Hepatic Rats

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Abstract:

This study wasaimed to investigate the effect of *Ziziphus spina- Christi* and *Cyperusesculentus*fruits on rats with Liver Disorders. Forty eight white male albino rats, weighing 140-150 g were used in this study. The animals were divided into two main groups. The first main group (n=6) was kept as a control (-ve) group, while rats in the second (n=42) were injected by Carbon Tetrachloride (CCL_4)to induce liver disorder. One of them was kept as a control (+) group and the other six groups treated with different percentages of Christ's Thorn,Tiger Nut fruit and mixture of them(2.5% and 5%) from the basel diet. At the end of experimental period (28 days), rats were fasted over night before slaughtering and blood was collected then centrifuged to separate the serum and estimate liver functions (AST,ALT and ALP) kidney functions (urea, creatinine and uric acid) lipid profile (T.C, T.G and HDL-c) while LDL-c and VLDL-c were calculated and blood analysis (HB ,RBCs ,HCT ,WBCs and PLT). The obtained results revealed that, treated groups by CCL_4 led to significant decrease in body weight gain% , HDL , total protein , Albumin and Globulin and increased AST,ALT and ALP, cholesterol, triglycerides, LDL-c, VLDL-c, uric acid, urea, creatinine. Treating groups which fed on Christ's Thorn, tiger nut fruit and mixture of themshowed significantly ($P \leq 0.05$) decreased levels of AST,ALT and ALP, Ldl , Vldl , cholesterol, triglycerides , urea, creatinine and uric acidand increase Hdl , total protein , Albumin and Globulin . It could be concluded that Christ's Thornand Tiger Nut fruit were effective inprotecting against hepatic rats not only decreased the level of AST,ALT and ALP but also has beneficial effect on lipids profile and renal profile. Therefore, data recommendas tested Christ's Thornand Tiger Nut by a moderate amount to be included in our daily diets.

Key words: Carbon Tetrachloride, Christ's Thorn, Tiger Nut, Renal profile, lipid profile, Liver profile.

Introduction

Liver is the largest glandular organ of the body which plays a pivotal role to regulate whole metabolic process and homeostasis of the body.

It is the most important site of intermediary metabolism and accountable for detoxifying any foreign material and other xenobiotics by converting and excreting waste and toxin.it is considered as one of the most vital organs due to handling the metabolism of carbohydrates, lipid, protein, secretion of bile, storage of vitamins and production of a variety of coagulation factors. thus the maintenance of healthy liver is imperative for human health **(Haidry and Malik, 2014).**

In spite of its extensive regenerative capacity, continuous various exposuresto environmental pollutants, xenobiotics, and chemotherapeutic agents could repress and overcome the natural protective ability of the liver, leading to liver malfunction and later if it is not treated properly leads to liver injury. today, alcohol misuse is one of the major health problems globally. There is a close relationship between ethanol intake and alcoholic liver disease, because of 80% of consumed alcohol is metabolized in the liver, consequently profound effect on the metabolism of lipids and lipoproteins. Moreover, ethanol is metabolized into cytotoxic acetaldehyde by enzyme alcohol dehydrogenase and acetaldehyde is oxidized to acetate by aldehyde oxidase or xanthine oxidase in the liver, giving rise to reactive oxygen species (ROS) via cytochrome P450 2E1 **(Lu and Cederbaum, 2008).**

This leads to oxidative stress in the hepatic cells which is the most striking initial expression of alcoholinduced liver injury that ultimately leads to the liver cell membrane and the cytosolic enzymes are leaked into the blood stream.

Therefore, the elevation of these cytosolic enzymes in the blood stream serves as a quantitative marker of hepatic damage **(Ramaiah, 2007).**

Christ's thorn distributed in Asian and African Arab countries and prefers to grow in edges of ponds, river and wadi banks where groundwater is available **(Adzuand Haruma, 2007).**

The flesh of *Z. spina-Christi* fruits is rich in carbohydrates (80.6% in dry matter) notably starch (21.8%), sucrose (21.8%), glucose

(9.6%) and fructose (16%) and in iron (3 mg 100 g-1 dried fruit; **(Abdelmuti, 1991)**.

One hundred gram dried fruit pulp contains 314 calories, 4.8 g protein, 0.9 g fat, 140 mg calcium, 0.04 mg of thiamin, 0.13 mg riboflavin, 3.7 mg niacin and 30 mg ascorbic acid **(Berry-Koch *et al*., 1990).**

Eromosele *et al*., (1991) found 98 mg of ascorbic acid in the mesocarp of *Z. spina-Christi*. This is a rather high value as compared with those of orange (50 mg), grape (38 mg) and strawberry (59 mg).

Ali and Hamed, (2006): showed that a number of cyclopeptide and isoquinoline alkaloids, flavonoids, terpenoids and their glycosides have been found to occur in various amounts in most *Ziziphus species*.

Tiger nut is rich in energy contents (starch, fat, sugars and protein), minerals (phosphorus, potassium) and vitamins E and C **(Belewu and Belewu ,2007).**

Cyperusesculentus has been reported to contain alkaloids, sterols, resins, cyanogenic glycosides, saponins and tannins. **(Ekeanyanwu *et al*., 2010)**.

Cyperusesculentus is recommended for infants and the elderly because of its high content in Vitamin E and its antioxidant benefits in the cell membrane **(Mohamed *et al*., 2005)**.

This study aimed to investigate the effect of Christ's thorn and tiger nut on the hepatic rats induced by CCL_4.

Materials And Methods

Materials

Christ's Thorn:

Christ's Thorn (*Ziziphus spina christi*) fruit wasobtained in December 2017 from local market at Bader City, Beheira Governorate, Egypt.

Tiger Nut:

Tiger Nut (*Syperusesculentus*) fruit wasobtained in January 2018 from local market in Kafr Al sheikh Governorate, Egypt.

Rats:

A total of (48) male Albino rats of weight ranges between (140-150 g) were obtained from Vaccine and Immunity Organization, Ministry of Health, Helwan Farm, Cairo, Egypt.

Carbon Tetra Chloride (CCL_4):

Carbon tetra Chloride (CCL_4)was obtained from El-Gomhoryia company for chemical Industries, Cairo, Egypt , as a toxic chemical for liver poisoning according to **Passmore and Eastwood , (1986).**

Methods

Preparation of materials

Christ's Thorn:

Fruits of Christ's Thorn were harvested in December, 2017. Christ's Thorn fruits were washed thoroughly under running tap water. Samples were collected, dried in air oven dryer at 40 ºC for two days and grinded to powder form

Tiger Nut:

Tiger Nut was grinded an powder.

Biological Experiments

Basal Diet

The basic diet prepared according to the following formula as mentioned by **(AIN, 1993)** as follow: casein (12%), Sunflower oil (10%), vitamin mixture (1%), mineral mixture (4%), choline chloride(0.2%) and the remained is corn starch (56.5%). The used vitamin mixture component was that recommended by **AOAC, (1990)**.

The Induction of Liver Experimental

On day 0, rats were injected subcutaneously at a dose of 0.2 ml/100 g body weight of 40 ml/l CCl_4 (Morgan Chemical Factory, Egypt) dissolved in paraffin oil (Morgan Chemical Factory, Egypt) (**Diao *et al.,* 2011)**. Carbon tetrachloride was injected two times per week for 2 consecutive weeks. Liver fibrosis was determined at the end of experimental by killing rats with histopathological examination.

Experimental Design

The experimentwas done in the Faculty of Home Economics, Menoufia University, Shebin El-Kom. Rats were housed in wire cages in a room temperature $25C^0$ and kept under normal healthy condition.

The rats will be divided into two main groups as following:

-The first main group :(n=6) fed on the basal diet as control negative.

-The second main group: (n = 42) hepatic rats.In this group rats were injected by CCL_4 by 2 mg per kg of rat’s body weight, then divided into the following subgroups:-

- Hepatic rats + basel diet (positive control).

- Hepatic rats + 2.5%fromChrist's Thorn
- Hepatic rats + 5% fromChrist's Thorn
- Hepatic rats + 2.5% from Tiger Nut
- Hepatic rats+ 5%from Tiger Nut
- Hepatic rats+ 2.5% from mixture of Christ's Thorn and Tiger Nut
- Hepatic rats+ 5% from mixture of Christ's Thorn and Tiger Nut

Biological Evaluation:

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

$$\text{BWG \%} = \frac{\text{(Final weight - Initial weight)}}{\text{Initial weight}} \times 100$$

$$\text{FER} = \frac{\text{Grams Gain in body weight (G)}}{\text{Grams Food consumed (G)}}$$

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. Two kinds of blood samples were taken. The first parts of blood samples were collected into a dry clean centrifuge glass tubes and left to clot in water bath (37°C) for 28 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 at -20°C till analysis according to the method described by **Schermer, (1967).**

Hematological analysis

Different tested parameters in serum were determination using specific methods as follow: cholesterol (**Thomas ,1992)**, triglycerides(T.G) (**Young, 1975) and (Fossati, 1982) ,** high density lipoprotein(HDL-C)**(Friedewaid, 1972) and (Grodon& Amer, 1977),** low density lipoprotein(LDL-C)**(Lee and Nieman, 1996),** very low density lipoprotein(VLDL-C)**(Lee and Nieman, 1996);** alanine

aminotransferase (ALT) **(ClinicaChimica Acta, 1980),** aspartate aminotransferase (AST) **(Hafkenscheid, 1979)**, alkaline phosphatase (ALP)**(Moss ,1982);**urea **(Patton and Crouch, 1977)**,creatinine **(Henry, 1974)**, uric acid **(Schuntz, 1984),** serum Proteins **(Henry, 1974) ,** Serum Albumin **(Doumas *et al.*, 1971)**andserum Globulin (**Chary and Sharma, 2004**)

Statistical analyses

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 Costat Program. Biological results were analyzed by One Way ANOVA.

Results and Discussion

Effect of Christ's Thorn,tiger nut fruit and mixture of them on body weight gain (BWG), feed intake (FI) and feed efficiency ratio (FER) of CCL_4 injected rats :

Data given in Table (1)show the changes of body weight, feed intake and feed efficiency ratio of CCL_4 injected rats fed diet supplemented with Christ's Thorn,tiger nut fruit and mixture of them.

The obtained results showed that the body weight gain (BWG) of positive control recorded the lowest value when compared with negative control with significant difference. The mean values were 1.49 and 3.43 %, respectively.

From CCL_4 injected rat groups, it is clear to notice that the highest (BWG) recorded for 5 % from mixture of Christ's thorn and tiger nut fruit, while the lowest BWG recorded for 2.5 % Christ's thorn fruit with significant difference ($P \leq 0.05$). The mean values were 2.95 and 2 %, respectively.

In case of feed intake, it could be noticed that the feed intake (FI) % of positive control recorded the lowest value when compared with negative control with significant difference. The mean values were 20 and 25.23 %, respectively.

While, 5 % from mixture of Christ's thorn and tiger nut fruit recorded the highest FI while the lowest value recorded for 2.5 % Christ's thorn fruit with no significant difference ($P \leq 0.05$). The mean values were 23.93 and 21%, respectively.

On the other hand, feed efficiency ratio (FER) of positive control recorded the lowest value when compared with negative control with no significant difference (P≤0.05). The mean values were .07 and .14 %, respectively.

In case of treated rat groups, it is clear to mention that 5 % from mixture of Christ's thorn and tiger nut fruit recorded the highest FER while, the lowest value recorded for 2.5% Christ's thorn fruit. The mean values were .123 and .09 %, respectively.

Umerie and Enebeli, (1997) showed a significant reduction in body weight gain about 12% especially in rats that supplemented with 20 % of Tiger Nut tubers. Although there wasa insignificant decrease in body weight gain of rats supplemented with 5% and 10 % Tiger Nut.

Feed intake significantly decreased in all groups when compared to the control group.

Effect of Christ's Thorn,Tiger Nut fruit and mixture of them AST,ALT and ALPof CCL_4 injected rats :

Data given in Table (2)show the effect of Christ's Thorn,Tiger Nut fruit and mixture of them on AST,ALT and ALPof CCL_4 injected rats.

The obtained results indicated that the ALT liver enzyme of positive control rats group recorded the highest value as compared to negative control group with a significant difference (P≤0.05). The mean values were 310.44 and 220.51 U/L, respectively.

While, the highest ALT liver enzyme of treated group recorded in group fed on 2.5 % Christ's thorn fruits but, the lowest value recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruits with significant difference (P≤0.05). The mean values were 296.14 and 239.55 U/L, respectively.

On the other hand, ASTliver enzyme of positive control rats group recorded the highest value when compared to negative control group with a significant difference (P≤0.05). The mean values were 144.66 and 126 U/L, respectively.

While, the highest AST and liver enzyme of treated group recorded for group fed on 2.5 % Christ's Thorn fruits but, the lowest value recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruits with significant difference (P≤0.05). The mean values were 139.33 and 129 U/L, respectively.

In case of ALP, liver enzyme of positive control rats group recorded the highest value when compared to negative control group with a significant difference (P≤0.05). The mean values were 312.66 and 247.66 U/L, respectively.

While, the highest ALP liver enzyme of treated group recorded for group fed on 2.5 % Christ's Thorn fruits but, the lowest value recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruits with a significant difference (P≤0.05). The mean values were 302.33 and 260.66 U/L, respectively.

The serum ALT, AST, GGT and ALP levels and T.B content were significantly higher (P≤0.05) in hepatotoxic groups than that in normal group.

The values of ALT, AST, GGT and ALP for 10% and 15% ZSCF levels were significantly lower than that of positive control.

Serum T.B content level in 5, 10 and 15% ZSCF groups were significantly lower (P≤0.05) than that of positive control.

ZSCF restores normal levels of both AlP and GGT in serum reduced the CCL_4-induced levels of ALT and AST. concluded that CCL_4 induced a severe hepatic damage, which represented in elevating markedly activities of ALT and AST in serum **(Shen *et al*. 2009)**.

Amin and Ghoneim, (2009) found that serum AST and ALT levels were significantly increased in the fibrosis group compared to that in the normal group, but were significantly decreased in the ZSCF treated groups .

As compared to normal rat, serum GGT activity increases 6.90 times after 8 weeks of CCL_4 induction; serum ALP content decreases 66% after 8 weeks of CCL4 induction. ZSCF restores normal levels of both AlP and GGT in serum reduced the CCL_4-induced levels of ALT and AST.

Effect of Christ's thorn, tiger nut fruit and mixture of them on total cholesterol and triglycerides level (mg/dl) of CCL_4 injected rats :

The effect of Christ's Thorn, tiger nut fruit and mixture of them on the serum lipid profiles of Ccl_4 injected rats are shown in Table (3).

The obtained results indicated that the triglyceride of positive control group recorded the highest value when compared to negative control group with a significant difference (P≤0.05). The mean values

were 150.66 and 79.23 mg/dl, respectively. while, the lowest triglyceride recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruit while the highest value recorded for 2.5 % Christ's thorn fruit with a significant difference (P≤0.05). The mean values were 92.4 and 138.46 mg/dl, respectively.

In the other hand, the cholesterol levels of positive control group recorded the highest value when compared to negative control group with a significant difference (P≤0.05). The mean values were 174.16 and 110 mg/dl, respectively. while, the lowest cholesterol levels recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruit while the highest value recorded for 2.5 % Christ's thorn fruit with a significant difference (P≤0.05). The mean values were 119.26 and 157.86 mg/dl, respectively.

Belewu and Abodunrin, (2006) reported that tiger nut intake reduces low density lipoprotein-cholesterol (LDL-C), triglycerides and increases high density lipoprotein-cholesterol (HDL-C) thereby reducing the risk of arteriosclerosis.

Effect of Christ's thorn, tiger nut fruit and mixture of them on the serum lipid profiles of CCL_4 injected rats:

Data presented in Table (4) show theeffect of Christ's Thorn,tiger nut fruit and mixture of them on the serum lipid profiles of CCL_4 injected rats.

The results indicated that the HDL-c of negative control rats group recorded the highest value when compared to positive control group with a significant difference (P≤0.05). The mean values were 55.33 and 24.16 mg/dl, respectively. while, the highest HDL-c of treated group recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruits but, the lowest value recorded for group fed on 2.5 % Christ's thorn fruits with a significant difference (P≤0.05). The mean values were 47.33 and 29.83 mg/dl, respectively.

On the other hand, the LDL-c of positive control rats group recorded the highest value when compared to negative control group with a significant difference (P≤0.05). The mean values were 119.36 and 43.36 mg/dl, respectively. while, the highest LDL-c of treated group recorded for group fed on 2.5 % Christ's thorn fruits but, the lowest value recorded for group fed on 5 % from mixture of Christ's thorn and

tiger nut fruits with significant difference (P≤0.05). The mean values were 110.16 and 58.23 mg/dl, respectively.

In case of VLDL-c, the positive control rats group recorded the highest value when compared to negative control group with a significant difference (P≤0.05). The mean values were 30.13 and 15.84 mg/dl, respectively. while, the highest VLDL-c of treated group recorded for group fed on 2.5 % Christ's thorn fruits but, the lowest value recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruits with a significant difference (P≤0.05). The mean values were 27.69 and 18.48 mg/dl, respectively.

These results are in agreement with **Shahat *et al*., 2001 and Tripathi *et al*., 2001),**they showed that serum cholesterol, triglyceride, LDL and VLDL were a significant (P≤0.05) higher in hepatotoxic positive control groups compared to that in normal group (negative control group).

The hepatotoxic groups were significantly improved by addition of ZSCF especially at 15% level which showed similar in serum cholesterol triglyceride, LDL and VLDL levels to negative control group.

HDL in hepatotoxic groups were improved by addition of ZSCF specially at 15% level. It is important to note that peptide and cyclopeptide alkaloids, flavonoids, sterols, tannins, butulinic acid and triterpenoidal saponin glycosides have been isolated and chemically identified from ZSCF.

Effect of Christ's Thorn, Tiger Nut fruit and mixture of them on urea, uric acid and creatinine of CCL_4 injected rats:

Data presented in Table (5)show the effect of Christ's Thorn,tiger nut fruit and mixture of them on urea, uric acid and creatinine of Ccl_4 injected rats.

The obtained results indicated that the urea level of positive control rats group recorded the highest value when compared to negative control group with significant difference (P≤0.05). The mean values were 43.66 and 21.26 mg/dl, respectively. while, the highest urea level of treated group recorded for group fed on 2.5 % Christ's thorn fruits but, the lowest value recorded for group fed on 5% from mixture of Christ's thorn and Tiger Nut fruits with a significant difference (P≤0.05). The mean values were 39 and 25.83 mg/dl, respectively.

On the other hand, the uric acid level of positive control rats group recorded the highest value when compared to negative control group with significant difference (P≤0.05). The mean values were 4.20 and 1.73 mg/dl, respectively. while, the highest uric acid level of treated group recorded for groups fed on 2.5 and 5 % Christ's thorn fruits but, the lowest value recorded for groups fed on 2.5 and 5 % from mixture of Christ's thorn and tiger nut fruits with significant difference (P≤0.05). The mean values were 3.82 and 2.87 mg/dl, respectively.

In case of creatinine, the level of positive control rats group recorded the highest value when compared to negative control group with significant difference (P≤0.05). The mean values were .82 and .36 mg/dl, respectively.

While, the highest creatinine level of treated group recorded for group fed on 2.5 % Christ's thorn fruits but, the lowest value recorded for group fed on 5 % from mixture of Christ's thorn and tiger nut fruits with significant difference (P≤0.05). The mean values were .73and .47 mg/dl, respectively.

Cyperusesculentus oil plays a beneficial role in mitigating renal dysfunction induced by exposure of the rats to high fat diet and low dose STZ and an indication of kidney dysfunction is observed as the levels of markers of kidney function (Creatinine, Urea, Sodium and Potassium) was significantly elevated p<0.05 in negative control (HFD+STZ) relative to the normal control and the treatment groups which were exposed to the same toxicant **(Ezeh *et al* ., 2014).**

Effect of Christ's Thorn, Tiger Nut fruit and mixture of them on Serum Total Protein , Serum Albumin and Serum Globulin of CcL_4 injected rats:

Data presented in Table (6) show the effect of Christ's Thorn, Tiger Nut fruit and their mixture on Serum Total Protein , Serum Albumin and Serum Globulinof Ccl_4 injected rats.

The obtained results indicated that Serum Total Protein level of positive control rats group recorded the lowest value when compared to negative control group with significant difference (P≤0.05). The mean values were 5.36 and 10.21 mg/dl, respectively. while, the highest Serum Total Protein level of treated group recorded for group fed on 5% from mixture of Christ's thorn and tiger nut fruits but, the lowest value recorded for group fed on 2.5 % Christ's thorn fruits with

significant difference (P≤0.05). The mean values were 9.66 and 6.51 mg/dl, respectively.

On the other hand, the Serum Albumin level of positive control rats group recorded the lowest value when compared to negative control group with a significant difference (P≤0.05). The mean values were 2.04 and 3.85 mg/dl, respectively. while, the highest Serum Albumin level of treated group recorded for group fed on 5% from mixture of Christ's thorn and tiger nut fruits but, the lowest value recorded for group fed on 2.5 % Christ's thorn fruits with significant difference (P≤0.05). The mean values were 3.45 and 2.23 mg/dl, respectively.

In case of the Serum Globulin level of positive control rats group recorded the lowest value when compared to negative control group with significant difference (P≤0.05). The mean values were 3.31 and 6.35 mg/dl, respectively. while, the highest Serum Globulin level of treated group recorded for group fed on 5% from mixture of Christ's thorn and Tiger Nut fruits but, the lowest value recorded for group fed on 2.5 % Christ's thorn fruits with significant difference (P≤0.05). The mean values were 6.21 and 4.28 mg/dl, respectively.

There was asignificant(p≤0.05) reduction in the serum level of total protein , albumin and globulin and increase in serum level of total and conjugated bilirubin although it is not statistically significant (p> 0.05), **(Raghuramulu *et al*.1993 ;Sarawat *et al*.,1993).**

There were a significant(p≤0.05) reduction in the serum level of total protein, albumin and globulin and increase in serum level of total and conjugated bilirubin with ethanolic extract of *Cyperusesculentus* at doses of 400 and 600 mg/kg **(Naganna,1989).**

Conclusion:

In conclusion, the tested Christ's thorn and Tiger nut in the present study had a good effect in protection againsthepatic rats induced by Ccl_4. These results supported our hypothesis that Christ's thorn and Tiger nut contain a lot amount of compounds such as protein, total dietary fiber, amino acids and total phenolics that are able to decrease AST,ALT and ALP.Also it could be improvement Renal profile , Lipid profile and serum glucose. So, we recommended that our daily diets should be containedof Christ's thorn and Tiger nut .

Table (1):Changes of body weight, feed intake and feed efficiency ratio of CCL_4 injected rats fed diet supplemented with Christ's Thorn,tiger nut fruit and mixture of them

	BWG (mean±SD)	FI (mean±SD)	FER (mean±SD)
G_1Negative Control (-ve)	3.43^{a} ±.09	25.23^{a} ± .25	$.14^{a}$ ± .006
G_2Positive Control (+ve)	1.49^{f} ± .09	20^{g} ± .2	$.07^{f}$ ± .004
$G_3$2.5% Christ's thorn	2^{e}± .14	21^{f} ± .1	$.09^{e}$ ± .01
$G_4$5% Christ's thorn	2.45^{d} ± .18	22.76^{d} ± .25	$.106^{cd}$ ± .006
$G_5$2.5% tiger nut	2.12^{e} ± .02	21.73^{e} ± .25	$.095^{de}$± .005
$G_6$5% tiger nut	2.61^{cd} ± .07	23.03^{cd} ± .15	$.11^{bc}$± .007
$G_7$2.5% mix	2.70^{c} ± .12	23.3^{c} ± .2	$.12^{bc}$ ± .01
$G_8$5% mix	2.95^{b} ± .07	23.93^{b} ± .15	$.123^{b}$± .006
LSD	.19	.35	.01

BWG=Body weight gain, FI=Feed intake, FER =Feed efficiency ratio.

Each value is represented as mean ± standard deviation (n = 6).

Mean with the same letters in the same column are not significantly different at P≤0.05.

Table (2): Effect of Christ's Thorn,tiger nut fruit and mixture of them on (ALP), (GOT) and (GPT) of CCL_4 injected rats

	ALT (U/L) (mean±SD)	AST (U/L) (mean±SD)	ALP (U/L) (mean±SD)
G_1Negative Control (-ve)	220.51^{h} ± .22	126^{d} ± 1	247.66^{g} ± 2.5
G_2Positive Control (+ve)	310.44^{a} ± .26	144.66^{a} ± 1 .5	312.66^{a} ± 2 .5
$G_3$2.5% Christ's thorn	296.14^{b} ± 1.93	139.33^{b} ± 2 .5	302.33^{b} ± 2 .5
$G_4$5% Christ's thorn	290.30^{c} ± .36	136.33^{b} ± 1 .5	292.66^{c} ± 2 .5
$G_5$2.5% tiger nut	281.79^{d} ± 1.66	135.66^{b} ± 2	283.33^{d} ± 1.5
$G_6$5% tiger nut	273.05^{e} ± 2.41	132^{c} ± 1	278.66^{d} ± 1.5
$G_7$2.5% mix	253.75^{f} ± 1.59	131.33^{c} ± 3.2	273^{e} ± 3.6
$G_8$5% mix	239.55^{g} ± 3.48	129^{cd} ± 1	260.66^{f} ± 4
LSD	3.19	3.27	4.7

Each value is presented as mean ± standard deviation (n = 6).

Means under the same column bearing different superscript letters are different significantly ($p \leq 0.05$).

Table (3): Effect of Christ's thorn,tiger nut fruit and mixture of them on the serum cholesterol and triglyceride of CCL_4 injected rats

Groups	Serum cholesterol (mg/dI)* (mean±SD)	Serum triglycerides (mg/dI)* (mean±SD)
G_1Negative Control (-ve)	$110^{h} \pm 2$	$79.23^{h} \pm 5.04$
G_2Positive Control (+ve)	$174.16^{a} \pm 3.33$	$150.66^{a} \pm 1.15$
$G_3$2.5% Christ's thorn	$157.86^{b} \pm 2.20$	$138.46^{b} \pm 1.75$
$G_4$5% Christ's thorn	$148.56^{c} \pm 1.40$	$128.26^{c} \pm 2.19$
$G_5$2.5% tiger nut	$141.3^{d} \pm 2.52$	$117.23^{d} \pm 1.75$
$G_6$5% tiger nut	$132.56^{e} \pm 2.31$	$108.4^{e} \pm 1.44$
$G_7$2.5% mix	$124.36^{f} \pm 2.22$	$101.53^{f} \pm 1.27$
$G_8$5% mix	$119.26^{g} \pm .97$	$92.4^{g} \pm 1.73$
LSD	3.85	4.07

Each value is represented as mean ± standard deviation (n = 6).

TG= Triglyceride. TC= Total Cholesterol,

Means with the same letters in the same column are not significantly different at P≤0.05

Table (4): Effect of Christ's Thorn,tiger nut fruit and mixture of them on the serum lipid profiles of CCL_4 injected rats

Groups	Serum HDL-c (mg/dI)* (mean±SD)	Serum LDL-c (mg/dI)* (mean±SD)	Serum VLDL-c (mg/dI)* (mean±SD)
G_1Negative Control (-ve)	$55.33^{a} \pm 1.53$	$43.36^{h} \pm 1.18$	$15.84^{h} \pm 1$
G_2Positive Control (+ve)	$24.16^{g} \pm 1.76$	$119.36^{a} \pm 4.22$	$30.13^{a} \pm .23$
$G_3$2.5% Christ's thorn	$29.83^{f} \pm .76$	$110.16^{b} \pm 2$	$27.69^{b} \pm .35$
$G_4$5% Christ's thorn	$33^{e} \pm 2$	$99.26^{c} \pm 3.61$	$25.65^{c} \pm .44$
$G_5$2.5% tiger nut	$36.33^{d} \pm 1.53$	$84.73^{d} \pm 3.84$	$23.44^{d} \pm .35$
$G_6$5% tiger nut	$40.7^{c} \pm .75$	$72.76^{e} \pm 2.24$	$21.68^{e} \pm .29$
$G_7$2.5% mix	$43^{c} \pm 1$	$64.6^{f} \pm 1.35$	$20.30^{f} \pm .25$
G_8 5% mix	$47.33^{b} \pm 2.52$	$58.23^{g} \pm 3.11$	$18.48^{g} \pm .35$
LSD	2.75	5.03	.81

HDL-C= High density lipoprotein Cholesterol. LDL =Low density lipoprotein Cholesterol

Each value is represented as mean ± standard deviation (n = 6).

Means with the same letters in the same column are not significantly different at P≤0.05

Table (5): Effect of Christ's Thorn, tiger nut fruit and mixture of them on serum urea , uric acid and serum Creatinine of CCL_4injected rats

Groups	Urea (mg/di) (mean±SD)	Uric Acid (mg/di) (mean±SD)	Creatinine (mg/di) (mean±SD)
G_1Negative Control (-ve)	21.26^{g}± . 87	1.73^{h}± . 02	$.36^{g}$ ± . 01
G_2Positive Control (+ve)	43.66^{a} ± 1.52	4.20^{a} ± .04	$.82^{a}$ ± .02
$G_3$2.5% Christ's thorn	39^{b} ± 2	3.82^{b} ± .04	$.73^{b}$ ± .03
$G_4$5% Christ's thorn	36^{c} ± 1	3.82^{c} ± .03	$.67^{c}$ ± .02
$G_5$2.5% tiger nut	33.33^{d} ± 1.52	3.73^{d} ± .04	$.69^{bc}$ ± .02
$G_6$5% tiger nut	30.26^{e} ± .94	3.52^{e} ± .02	$.57^{d}$ ± .03
$G_7$2.5% mix	28.43^{e} ± .81	2.87^{f} ±.03	$.53^{e}$ ± .02
$G_8$5% mix	25.83^{f} ± 1.75	2.87^{f} ± .04	$.47^{f}$ ± .03
LSD	2.37	.05	.036

Each value is represented as mean ± standard deviation (n = 6

Mean under the same column bearing different superscript letters are different significantly ($p \leq 0.05$).

Table (6): Effect of Christ's Thorn, tiger nut fruit and mixture of them on Serum Total Protein , Serum Albumin and Serum Globulin of CCL_4 injected rats

Groups	Total Protein (g/L) (mean±SD)	Albumin (mg/di) (mean±SD)	Globulin (mg/di) (mean±SD)
G_1Negative Control (-ve)	10.21^{a} ± .09	3.85^{a} ± .03	6.35^{a} ± .08
G_2Positive Control (+ve)	5.36^{h} ± .05	2.04^{h} ± .04	3.31^{g} ± .02
$G_3$2.5% Christ's thorn	6.51^{g} ± .02	2.23^{g} ± .03	4.28^{f} ± .02
$G_4$5% Christ's thorn	7.25^{f} ± .05	2.43^{f} ± .02	4.82^{e} ± .04
$G_5$2.5% tiger nut	7.61^{e} ± .04	2.85^{e} ± .01	4.76^{e} ±.04
$G_6$5% tiger nut	8.27^{d} ± .05	3.06^{d} ± .03	5.21^{d} ± .02
$G_7$2.5% mix	8.99^{c} ± .12	3.25^{c} ± .04	5.74^{c} ± .11
$G_8$5% mix	9.66^{b} ± .06	3.45^{b} ± .03	6.21^{b} ± .04
LSD	.11	.05	.09

Each value is represented as mean ± standard deviation (n = 6)

Mean under the same column bearing different superscript letters are different significantly ($p \leq 0.05$).

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تأثير ثمار النبق وحب العزيز علي الخلل الحادث في كبد الفئران المصابه برابع كلوريد الكربون

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الملخص العربي

تم اجراء الدراسة الحالية لمعرفة تأثير استخدام ثمار النبق وحب العزيز لتحسين مرض الكبد. أجريت الدراسة علي48 فأر البينو ذكور تتراوح اوزانهم من 140 - 150 جم ، تم تغذيتهم علي الوجبة الاساسية لمدة اسبوع، ثم قسمت بعد ذلك الي مجموعتين اساسيتين، المجموعه الاولى 6 فئران (المجموعة الضابطة السالبة) حيث تم تغذية هذه المجموعة علي الوجبة الاساسية طوال فترة التجربة.ثم تم حقن 7 مجموعات برابع كلوريد الكربون وعددهم 42 فأر بمقدار 2 ملجم/ كجم من وزن الجسم بمادة رابع كلوريد الكربون بهدف احداث خلل في وظائف الكبد ثم تم تقسيمهم الى مجموعات فرعية كالتالي: المجموعة الضابطة الموجبة حيث تم تغذيتها علي الوجبة القياسيه طوال مدة التجربة.- بينما الست مجموعات الاخري تم اضافة ثمار النبق وحب العزيز ومخلوط من كليهما بنسب 2.5% ،5% من الوجبة الاساسية . وفي نهاية التجربة ثم وزن الفئران ثم ذبحهم وتجميع عينات الدم بعد صيام 12 ساعة وتم قياس انزيمات الكبد (ALT,ALP, AST)، الكولسترول الكلي، الجلسريدات الثلاثية، ووظائف الكلي (اليوريا ، الكرياتنين، حمض اليوريك)،(البروتين ، الجلوبيولين ، الالبيومين). وقد اظهرت نتائج هذه الدراسة ان مجموعه الكنترول الموجبه ادت الي انخفاض في وزن الجسم والبروتين والجلوبيولين والالبيومين وارتفعت الدهون الثلاثيه وانزيمات الكبد بينما المجموعات المعالجه بالنبق وحب العزيزانخفض فيها انزيمات الكبد والدهون وارتفع وزن الجسم والبروتين والجلوبيولين و الالبيومين. وقد اظهرت هذه الدراسه ان التغذيه علي ثمار النبق وحب العزيز نتج عنها تحسن في وظائف الكبد والكلي ودهون الدم وانخفاض مستوى الجلوكوز بالدم لدى الفئران البيضاء المصابة بالكبد.

الكلمات المفتاحية :- وظائف الكبد ، وظائف الكلي ، دهون الدم ، رابع كلوريد الكربون، ثمار النبق ، ثمار حب العزيز .