The Therapeutic Effect of Carrot Seed Extract (*Daucus carota L.)* on Liver and Kidney Injury Induced by Carbon Tetrachloride in Experimental Rats

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Abstract

The present study was carried out to investigate the therapeutic effect of carrot seed extract (Daucus carota L.) on liver and kidney injury induced by CCL_4 in experimental rats. Following the adaptation period thirty (30) normal male albino rats (Sprague-Dawely Strain) weighing 200 ± 10 g were randomly divided into two main groups. The first group (n=6) was a negative control group fed on weighing diet. The remaining animals (n = 24 rats) were injected with CCl_4 which mixed with paraffin oil (50% v/v 2 ml/ kg bwt.) twice a week for two weeks to induce liver and kidney injury. Then divided into 4 group (n=6). The first served as positive control group and the 3rd to 5th group were received carrot seed extract 50, 100, and 200 mg/Kg, respectively. After six weeks of the experiment liver functions, kidney functions and lipid profile were analyzed. The liver and kidney were examined histologically. The results indicated that groups 3, 4, and 5 had lower liver functions than the positive control group. In comparison to the positive control group, all examined groups had significant improvements in kidney functions, cholesterol, triglycerides, and lipid profiles.. The results of histological investigations, which correlated with the biochemical study, significantly improved with the addition of carrot seed extract. Finally, this study suggests that carrot seed extract may be useful for patients who suffer from liver and kidney diseases.

Keywords: Carrot seed extract, Liver functions, Kidney Functions, Lipid Profile, CCL_4.

Introduction

The liver is the biggest internal gland and plays a variety of vital functions in the body. Every cell in the organ, both parenchymal and nonparenchymal, has a distinct role **(Hassani ,2022)**. It weighs 1.5 to 2 kg in an

adult human and it is separated into two lobes. The right lobe is bigger than the left. It extends across the midline to the left upper quadrant of the abdomen from its location in the right upper quadrant. It contributes significantly by metabolizing medicines and harmful chemicals and maintaining blood glucose levels. In addition to performing a number of metabolic functions, including bile formation, bilirubin synthesis, and protein, lipid, and carbohydrate metabolism, it serves as an auxiliary organ in digestion. It is remarkably capable of healing its damaged tissues **(Mohajan, 2025)**.

The kidney is a vital organ in the human body because it is crucial for the filtration, metabolism, and excretion of substances. They also control blood pressure, minerals, and bodily fluids. Hormones required for the production of red blood cells and strong bones are produced by the kidneys. Damage to the heart and blood vessels can also result from abnormal kidney function **(Fadem, 2022).** The kidneys are an essential organ that can suffer from acute kidney injury (AKI) and chronic kidney disease (CKD), which can be brought on by a number of risk factors, including diabetes, ischemia, sepsis, drug toxicity and overdose, and exposure to heavy metals **(Yan,2021)**.

Although it is not found naturally, CCL_4 is a transparent liquid with a pleasant smell that is detectable at low doses. CCL_4 was employed as a precursor to propellants and refrigerants, as well as a degreaser and cleaning agent in residences, factories, and textile dry cleaning facilities. Because of its severe toxicity and negative effects, the majority of its use is currently forbidden **(Al Amin, 2021).** CCl_4 is a potent hepatotoxic, nephrotoxic, and prooxidant agent that has been used extensively in recent years to produce hepatocellular carcinoma,hepatic fibrosis/cirrhosis, liver injury,chemical hepatitis models, renal failure models, and nephrotoxicity models in addition to inducing hepatotoxicity in experimental animals **(Unsal *et al.*,2021)**.

Furthermore, a variety of herbal antioxidants might protect organs from oxidative stress caused by CCl_4. The essential oils' distinct nutritional significance has garnered a lot of attention lately **(Majzoobi *et al.*, 2016).** Carrot oil (*Daucus carota L.)* belongs to the family of Apiaceae*,* and has 13 subspecies, of which one is cultivated *(D. carota L. ssp. sativus (Hoffm.) Arcang.)* and the others are wild. The wild carrot's antilithic, diuretic, carminative, antibacterial, and anti-inflammatory qualities have long been

known, and it has been used to treat cancer, prostatitis, gout, cystitis, and urinary calculus **(Ismail *et al.*, 2024).**

Carrot seed extract (CSE) possesses antimicrobial properties and antioxidants **(Hajirostamloo *et al.*, 2022)**. Carrot seed extracts contain large amounts of alkaloids, flavonoids and steroids, which may contribute to their high antioxidant properties (**Tijjani *et al.*, 2019)**.

Organ-to-organ communication has received increasing attention in recent years. As contemporary medical physiology and pathology have advanced, it has been found that the human body's organs and tissues may communicate with one another **(Wang *et al.*, 2021)**, therefore the presented study attempts to investigate the effect of dietary supplementation with carrot seed extract (*Daucus carota L.)* on liver and kidney injury induced by carbon tetrachloride in experimental rats.

Materials and Methods

Materials

- CCL_4, casein, starch, corn oil, mineral, and vitamin mixtures were bought from El-Gomhorya Company for Trading Drugs, Chemicals and Medical Instruments, Cairo, Egypt.
- Kits of analyzed items were purchased from El-Gomhorya Company, Cairo, Egypt.
- The seeds of carrot used for the extraction were obtained from the local market in Egypt.

Animals

Thirty (30) normal male albino rats (Sprague-Dawely Strain) weighing 200 ± 10 g were obtained from the agriculture research center , Giza, Egypt.

Methods

Preparation of the Carrot Seed Extract (CSE)

For a full day, 88 grams of finely crushed carrot seeds were macerated in two liters of 95.5% ethanol. The process was carried out three times. Following filtration, the filtrate was concentrated in vacuo at 50°C in a rotary evaporator (Heidolph, Laborota 4003), producing a 24.31% ethanolic extract of carrot seeds. To create the necessary quantities of CSE, the ethanolic extract was dissolved in a 4:1 solution of DMSO and normal saline before being administered to the animals **(Nouri *et al*., 2009)**

Basal diet:

According to the formula listed by **AIN (1993)**, the basal diet is made as follows: 14% protein, 4% corn oil, 1% vitamins, 3.5% mineral mixture, 0.2% choline chloride, 0.3% methionine, 5% cellulose, and 28% corn starch are the remaining ingredients. The salt combination used was developed in accordance with **Hegested *et al.,* (1941)**, while the composition of the vitamin blend was proposed by **Campbell (1963).**

Induction of liver and kidney impaired in rats:

Carbon tetrachloride (CCL_4) has been used for impairing liver and kidney twice a week for two weeks via intraperitoneally by injection of carbon tetrachloride in paraffin oil (50% v/v 2 ml/ kg bwt.), during which liver and kidney injury occurred, according to **Jayasekhar *et al.,* (1997)**

Experimental Design

Animals were divided into five equal groups (n=6)

The first main group : Rats fed on basal diets **(negative control)**.

The Second main group**:** Liver and kidney injury rats divided into 4 groups, (6 of each) as follow:

Sub-Group(1): Rats injected with CCL_4 **(positive control)**.

Sub-Group(2): Rats received CSE (50 mg/Kg b.w) for 4 weeks.

Sub-Group(3): Rats received CSE (100 mg/Kg b.w) for 4 weeks.

Sub-Group(4): Rats received CSE (200 mg/Kg b.w) for 4 weeks**.**

Following the final of the experiment (6weeks), all rats were given free access to water but starved for 12 hours. Blood samples were drawn from the orbital sinus veins and placed in ethylene diaminetetra acetic acid (EDTA) tubes for whole blood and dry centrifuge tubes for serum, liver and kidney were removed. Serum, liver, and kidney were separated and then stored at -20°C until used. According to **Bancroft *et al.* (1996)** prepared the liver and kidney for histopathological testing by washing them in saline and letting them settle in 10% neutral buffered formalin for a full day.

Biological Determination

The diets were consumed during the six-week experiment, and body weights were recorded twice a week. Body weight gain percentage (BWG%) and organ weight/body weight percentage were used to assess the biological effects of the various diets that were examined according to **Chapman et al.,**

(1959). BWG% = [(Final weight - Initial weight) / (Initial weight)] X 100 Organ relative weight % = (Organ weight / Final weight) X 100.

Biochemical Analysis

Serum levels of the enzyme alanine aminotransferase (ALT) were measured in accordance with **Sherwin (1984).** Aspartate aminotransferase (AST) was identified using **Young (1990)** methodology. Alkaline phosphatase (ALP) in serum was measured using **Roy (1970)** method. Serum urea nitrogen and serum uric acid were measured using a spectrophotometer (DU 4700) set at 580 nm according to **Fossati *et al.*, (1980).** A spectrophotometer (DU 7400) set at 580 nm was used to measure creatinine using the method described by **Henry (1974)**. **Young (2001)** was utilized to determine high-density lipoprotein cholesterol (HDL-c), triglycerides (TG), and total cholesterol (TC). LDL-c, or low-density lipoprotein cholesterol, has been determined using a method described by **Friadwald et al. (1972)**.

Statistical analysis

The SPSS software was utilized to analyze the data. In order to ascertain whether the groups' differences were statistically significant, an ANOVA was conducted **(SPSS, 1986).**

RESULTS AND DISCUSSION

Impact of Carrot Seed Extract (CSE) on Nutritional Status in rats with liver and kidney injury

Data presented in Table (1) showed the impact of carrot seed extract (CSE) on feed intake (FI), initial body weight (IBW), final body weight (FBW) and relative body weight (RBWG%) in rats with liver and kidney injury.

There was no statistically significant difference between the negative control group, the positive control group, and all treated groups on IBW. It was found that rats with liver and kidney injury had a significant decrease in the FI, FBW, BWG and RBWG % as compared to the normal rats. This decrease in biological levels is due to chronic exposure to liver and kidney injury in rats which was induced by carbon tetrachloride.

The obtained results in Table (1) are in the same trend as **Abd EL-Meged & AlShehri, (2020**) who found that injected rats by CCl_4 caused a decrease in body weight gain and this research findings. Also **Ullah et al., (2020)** reported that the water and feed intake was much lower in the CCL_4-injected groups.

Table (1): Impact of Carrot Seed Extract (CSE) on Nutritional Status in rats with liver and kidney injury

Parameters / Groups	FI(g)	IBW(g)	FBW(g)	RBWG%
negative control	$16.33^{a}\pm0.94$	$217.33^{a}\pm20.23$	$303.67^{a}\pm9.88$	$43.47^{a}\pm16.58$
positive control	$13.33^{c}\pm1.25$	$214.33^{a}\pm3.68$	$253.67^{c}\pm15.32$	$26.3^{c}\pm12.52$
50mg/Kg CSE	$14.67^{b}\pm0.94$	$213.67^{a}\pm14.83$	$277.33^{b}\pm35.64$	$27.07^{bc}\pm8.09$
100mg/Kg CSE	$15.33^{ab}\pm0.47$	$214.33^{a}\pm4.92$	$271.33^{bc}\pm32.84$	$34.77^{ab}\pm12.38$
200mg/Kg CSE	$16.67^{a}\pm1.70$	$211.67^{a}\pm26.04$	$301.33^{a}\pm39.72$	$42.57^{a}\pm7.99$

CSE: Carrot Seed Extract; FI: Feed Intake; IBW: Initial Body weight; FBW: Final Body Weight; RBWG%: RelativeBody Weight. Each value represents the mean ± SD. Means in the same column with different superscript letters are significantly different at $p<0.05$.

The mean values of FI, FBW, BWG and RBWG % in all treated groups showed a significant increase ($P<0.05$), as compared to the positive control group. The highest results in FBW and RWBG% recorded for the group treated with 200mg/Kg CSE followed by the groups treated with 100mg/Kg CSE and 50mg/Kg CSE, respectively. On the other hand treating rats with (100mg/Kg CSE and 200mg/Kg CSE) caused nonsignificant differences and changed the mean values of feed intake as compared to the negative control group.

Numerous studies have demonstrated that giving an ethanolic extract of carrot seeds improved body weight gain, and this group also recorded increased total food consumption in rats **(Mohamed *et al.*, 2019)**.

Furthermore, **Jafarinejad *et al.* (2022)** indicated the effect of carrot extract on memory in rats on body weight, and the amount of food and water intake. also showed that (200 mg/kg) treated group had not any change in their weight compared to the control group and in the 200 mg/kg carrot seed extract group, feed and water intake was significantly increased compared to the control group.

Impact of Carrot Seed Extract (CSE) on Some Organ Weight/Body Weight % in Rats with Liver and Kidney Injury

Data presented in Table (2) showed the impact of carrot seed extract (CSE) on liver weight/ body weight %and kidney weight/ body weight % in rats with liver and kidney injury.

The mean value of liver weight/ body weight %and kidney weight/ body weight % in healthy rats (negative control group) showed a significant decrease ($P<0.05$), as compared to the liver and kidney injury group (positive control

group).This finding is consistent with the findings of **Ullah *et al.*, (2020),** which showed that after receiving the CCl_4 injection, a significant increase in liver weight.Also, **El-Hashash et al., (2020)** revealed that the CCl 4-treated group's relative liver and kidney weights increased significantly.

Treating rats with (100mg/Kg CSE and 200mg/Kg CSE) caused non-significant differences and changed the mean values of liver weight/ body weight % and kidney weight/ body weight % as compared to the negative control group. The highest results in liver weight/ body weight % and kidney weight/ body weight % were recorded for the group treated with 50mg/Kg CSE followed by the groups treated with 100mg/Kg CSE and 50mg/Kg CSE ,respectively.

This is due to its high level of unsaturated fatty acids. Oleic acid is the primary component of carrot seed with linoleic acid coming in second. Antioxidant and health-promoting properties are also present in carrot seed (**Aksu *et al.*, 2020)**.

Table (2): Impact of Carrot Seed Extract (CSE) on Some Organ Weight/Body Weight % in Rats with Liver and Kidney Injury

Parameters / Groups	liver weight/ body weight %	Kidney weight/ body weight %
negative control	$3.26^{c}\pm0.25$	$0.59^{c}\pm0.01$
positive control	$4.55^{a}\pm0.33$	$0.81^{a}\pm0.16$
50mg/Kg CSE	$4.05^{b}\pm0.19$	$0.71^{b}\pm0.11$
100mg/Kg CSE	$3.7^{bc}\pm0.29$	$0.66^{bc}\pm0.05$
200mg/Kg CSE	$3.63^{bc}\pm0.34$	$0.64^{bc}\pm0.07$

CSE: Carrot Seed Extract. Each value represents the mean ± SD. Means in the same column with different superscript letters are significantly different at $p<0.05$.

Impact of Carrot Seed Extract (CSE) on Liver Functions in Rats with Liver and Kidney Injury

Data presented in Table (3) showed the impact of carrot seed extract (CSE) on alanine transaminase (ALT), aspartate transaminase (AST) and alanine transaminase and alkaline phosphatase (ALP) in rats with liver and kidney injury.

ALT, AST and ALP activities were elevated significantly by carbon tetrachloride administration, the values were (77.33±1.70,111±2.94and 473.33±7.72, U/L respectively) compared to the negative control (44.33±0.47, 62±2.16 and 195±4.08 U/L respectively).

These results are in line with **Mazani *et al.,* (2020),** who found that hepatic enzymes (aspartate aminotransferase, alanine transaminase, and alkaline phosphatase) significantly increased after CCL_4 was administered. Also,**Lamia *et al.,* (2021)** reported that serum levels of alkaline phosphatase (ALP), aspartate aminotransferase (AST), and alanine aminotransferase (ALT) were found to be higher in CCl_4 rats compared to controls.

Also, a significant ($P<0.05$) reduction was observed in the activities of AST, ALT and ALP for all treatment groups treated with 50,100 and 200 mg/Kg CSE as compared to the positive control group. On the other hand, no significant difference was observed between groups 3 and 4 (50 and 100mg/Kg CSE) in ALT, AST and ALP. Also, the best results in ALT, AST and ALP recorded for the group treated with 200mg/Kg CSE followed by the groups treated with 100mg/Kg CSE, respectively.

The present findings agreed with those of **Varshney & Mishra (2022),** who reported that carrot seed oil may have occlusive properties. After receiving carrot seed extraction, rats' serum levels of glutamate dehydrogenase, alanine transaminase, and aspartate aminotransferase were all significantly decreased.

Kwatra (2020) found that carrot extract prevents the liver from acute disease caused by the damaging effects of substances found in the environment. The study assessed the impact of carrot extract on acute liver injury in rats caused by carbon tetrachloride . The rise in pretreatment with the carrot seed extract resulted in a substantial decrease in serum enzyme levels (ALT,AST and ALP) by CCL_4-induction.

Shebaby et al., (2021) showed that carrot oil extract possesses antioxidant, anticancer, and anti-inflammatory properties. Because of its high concentration of phenolic compounds, sterols, long-chain fatty acids (C16–C20), unsaturated fatty acids, and scent, carrot seed oil is well known to provide nutritional and physiological benefits (**Boran *et al.,* 2023)**.

Table (3): Impact of Carrot Seed Extract (CSE) on Liver Functions in Rats with Liver and Kidney Injury

Parameters / Groups	ALT(U/L)	AST(U/L)	ALP(U/L)
negative control	$44.33^{d}\pm0.47$	$62^{d}\pm2.16$	$195^{d}\pm4.08$
positive control	$77.33^{a}\pm1.70$	$111^{a}\pm2.94$	$473.33^{a}\pm7.72$
50mg/Kg CSE	$70.67^{ab}\pm1.25$	$94.33^{b}\pm2.06$	$383^{ab}\pm5.10$
100mg/Kg CSE	$66.33^{b}\pm0.47$	$85.33^{bc}\pm1.25$	$307^{b}\pm7.87$
200mg/Kg CSE	$55.67^{c}\pm1.25$	$73^{c}\pm1.73$	$240^{c}\pm8.16$

CSE: Carrot Seed Extract; ALT: Alanine Aminotransferase; AST: Aspartate Aminotransferase; ALP: Alkaline phosphatase. Each value represents the mean ± SD. Means in the same column with different superscript letters are significantly different at $p<0.05$.

Impact of Carrot Seed Extract (CSE) on Kidney Functions in Rats with Liver and Kidney Injury

Data presented in Table (4) showed the impact of carrot seed extract (CSE) on creatinine, urea nitrogen and uric acid in rats with liver and kidney injury.

The serum creatinine, urea nitrogen and uric acid were elevated significantly by carbon tetrachloride administration,the values were (1.03±0.21, 67.67±0.94 and 4.3±0.08 mg/dl , respectively) compared to negative control group (0.7±0.08, 41.67±0.94 and 2.63±0.05 mg/dl, respectively). These results agreed with the results of **Mazani *et al.,* (2020)** who investigated renal (blood urea nitrogen and creatinine) signs significantly increased when CCL_4 was administered.

While there was a significant ($P \leq 0.05$) decrease in serum urea, uric acid and creatinine for all treatment groups treated with 50,100 and 200 mg/Kg CSE as compared to the positive control group. to the positive between groups 3 and 4 (50 and 100mg/Kg CSE) in urea nitrogen. In addition to the best results in ALT, AST they were recorded for the group treated with 200mg/Kg CSE followed by the groups treated with 100mg/Kg CSE, respectively.

These results agreed with the results of **Kwatra (2020)** found that when rats were given CCL_4, the increased kidney functions was reduced by the carrot seed extract and decreasing free radical scavenging activity**.**

Boran *et al.,* (2023) also reported that carrot seed oil biological activity was high. Unsaturated fatty acids, which are vital for human health, are abundant in carrot seed oil and it is also a good source of β-caryophyllene, daucol, and carotol **(Priyanka & Khanam, 2020)**.

Therefore, the ethanolic extract of *D. carota* seeds improves of the serum levels of creatinine, urea, and uric acid suggests the seed extract's potential as an antiuremic **(Salimon *et al.*, 2017).**

Table (4): Impact of Carrot Seed Extract (CSE) on Kidney Functions in Rats with Liver and Kidney Injury

Parameters / Groups	Creatinine mg/dl	Urea Nitrogen mg/dl	Uric Acid mg/dl
negative control	$0.7^{c}\pm0.08$	$41.67^{c}\pm0.94$	$2.63^{d}\pm0.05$
positive control	$1.03^{a}\pm0.21$	$67.67^{a}\pm0.94$	$4.3^{a}\pm0.08$
50mg/Kg CSE	$0.93^{ab}\pm0.09$	$51^{b}\pm0.82$	$3.73^{b}\pm0.12$
100mg/Kg CSE	$0.9^{b}\pm0.08$	$55.67^{b}\pm1.25$	$3.13^{c}\pm0.21$
200mg/Kg CSE	$0.73^{bc}\pm0.05$	$42.67^{c}\pm1.53$	$2.93^{d}\pm0.05$

CSE: Carrot Seed Extract. Each value represents the mean ± SD. Means in the same column with different superscript letters are significantly different at $p<0.05$.

Impact of Carrot Seed Extract (CSE) on Lipid Profile in Rats with Liver and Kidney Injury

Data presented in Table (5) showed the impact of carrot seed extract (CSE) on serum cholesterol, triglyceride, HDL-c, LDL-c and VLDL-c in rats with liver and kidney injury.

The mean value of cholesterol, triglyceride,, LDL-c and VLDL-c in the positive control group showed a significant increased($P<0.05$), as compared to the negative control group. While the mean value of HDL-c in the positive control group showed a significant decreased ($P<0.05$), as compared to negative control group.

The current study was in agreement with **Ahmad Khan *et al.*, (2023)** who found that when rats were given CCL_4, total Cholesterol, triglycerides,VLDL and LDL levels were higher than usual while, HDL was lower.

On the other hand, cholesterol, triglyceride, LDL-c and VLDL-c were decreased significantly ($P<0.05$) in all treatment groups compared to control positive group, but increased significantly ($P<0.05$) in HDL-c, compared with control positive group. The best results in cholesterol, triglyceride HDL-c, LDL-c and VLDL-c recorded for the group treated with 200mg/Kg CSE followed by the groups treated with 100mg/Kg CSE, respectively. While, the least amount of LDL-c and VLDL-c recorded for the group treated with 100mg/Kg CSE.

Similar findings coincided by **Kwatra (2020)** who showed that experimental carrot-fed rats exhibited a reducing impact on cholesterol absorption. A significant reduction in the levels of triglyceride and hepatic cholesterol. The findings showed that consuming carrots may help prevent atherosclerosis-related cardiovascular disease. Dietary fiber and antioxidant polyphenols in carrots may work in concert to provide the effect.

Also, **Varshney & Mishra (2022)** reported that carrot seeds have a hypolipidemic impact in rats. Lower levels of total cholesterol, triglycerides, HLD, and VLDL were observed in rats fed carrot seeds as opposed to rats fed a control group.

Table (5): Impact of Carrot Seed Extract (CSE) on Lipid Profile in Rats with Liver and Kidney Injury

Parameters / Groups	Cholesterol (mg/dl)	Triglyceride (mg/dl)	HDL-c (mg/dl)	LDL-c(mg/dl)	VLDL-c (mg/dl)
Negative control	$109.67^{c}\pm1.25$	$84^{e}\pm1.41$	$31.93^{a}\pm0.19$	$43.53^{d}\pm2.46$	$16.8^{e}\pm0.28$
Positive control	$134.67^{a}\pm0.94$	$193.67^{a}\pm2.62$	$26.4^{e}\pm0.28$	$80.8^{a}\pm1.57$	$38.73^{a}\pm0.52$
50mg/Kg CSE	$124.33^{b}\pm1.25$	$29^{b}\pm3.27$	$27.2^{d}\pm0.16$	$68.07^{b}\pm1.89$	$31.71^{b}\pm8.93$
100mg/Kg CSE	$118^{bc}\pm2.45$	$116.67^{c}\pm2.87$	$28.13^{c}\pm0.34$	$62.53^{c}\pm1.23$	$23.33^{c}\pm0.57$
200mg/Kg CSE	$114^{c}\pm1.63$	$90.67^{d}\pm2.082$	$29.67^{b}\pm0.41$	$47.87^{d}\pm2.90$	$18.13^{d}\pm0.34$

CSE: Carrot Seed Extract; HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; VLDL: Very Low Density Lipoprotein. Each value represents the mean ± SD. Means in the same column with different superscript letters are significantly different at $p<0.05$.

Histopathological examination of liver:

Microscopically, the liver of rats from group 1 was negative (-) revealed the normal histological architecture of the hepatic lobule (Photo 1). Light microscopic examination of liver sections of rats from group 2 positive (+) showed histopathological damage characterized by vacuolar degeneration of hepatocytes, infiltration of portal triad with inflammatory cells and cystic dilatation of bile duct (Photo 2). Meanwhile, the livers of rats from group 3 (50mg/Kg CSE) revealed vacuolar degeneration of some hepatocytes and portal infiltration with few inflammatory cells (Photo 3). Meanwhile, the livers of rats from group 4 (100mg/Kg CSE) exhibited only mild hydropic degeneration of some hepatocytes (Photo 4). Otherwise, some examined sections from group 5 (200mg/Kg CSE) showed mild hydropic degeneration of some hepatocytes (Photo 5).

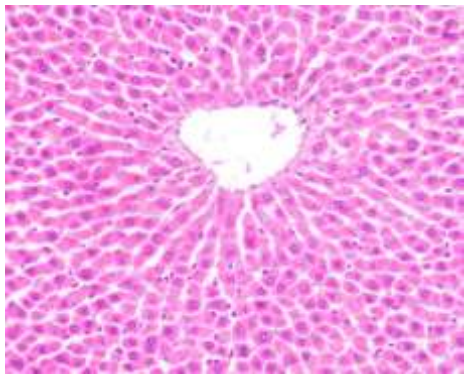
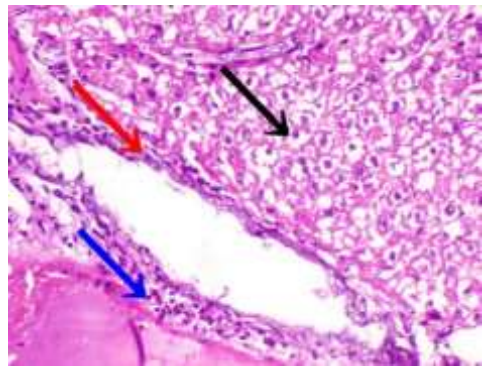


Photo (1): Photomicrograph of liver of rat from group 1 showing the normal histological architecture of hepatic lobule (H & E X 200).



Photo(2): Photomicrograph of liver of rat from group 2 showing vacuolar degeneration of hepatocytes (black arrow), infiltration of portal triad with inflammatory cells (blue arrow) and cystic dilatation of bile duct (red arrow) (H & E X 200).

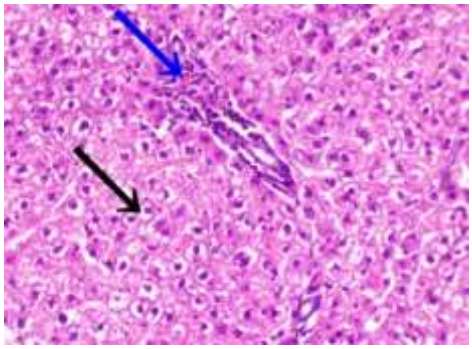


Photo (3): Photomicrograph of liver of rat from group3 showing mild vacuolar degeneration of some hepatocytes (black arrow) and portal infiltration with few inflammatory cells (blue arrow) (H & E X 200).

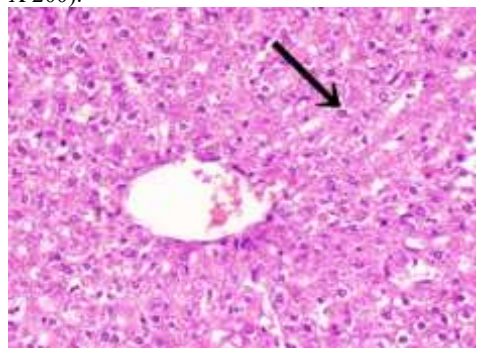


Photo (4): Photomicrograph of liver of rat from group 4 showing mild hydropic degeneration of some hepatocytes (black arrow) (H & E X 200).

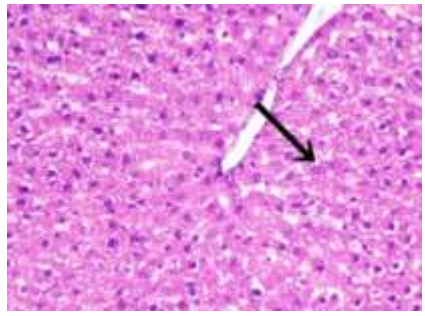


Photo (5): Photomicrograph of liver of rat from group 5 showing mild hydropic degeneration of some hepatocytes (black arrow) (H & E X 200).

Histopathological examination of kidneys:

Microscopically, kidneys of rats from negative group 1 (-) revealed no histopathological changes (Photo 6). kidneys of rats from group 2 positive (+) showed renal damage characterized by severe vacuolar degeneration of epithelial lining renal tubules and congestion of glomerular tuft (Photo 7). Meanwhile, kidneys of rats from group 3 (50mg/Kg CSE) revealed vacuolar degeneration of epithelial lining some renal tubules and slight congestion of glomerular tuft (Photo 8). Furthermore, kidneys of rats from group 4 (100mg/Kg CSE) showed mild vacuolar degeneration of epithelial lining sporadic renal tubules (Photo 9). On the other hand, kidneys of rats from group 5 (200mg/Kg CSE) exhibited no histopathological lesions (Photo 10).

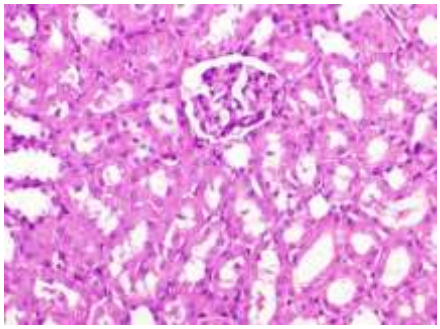


Photo (6): Photomicrograph of kidney of rat from group 1 showing the normal histological architecture of renal parenchyma (H & E X 200).

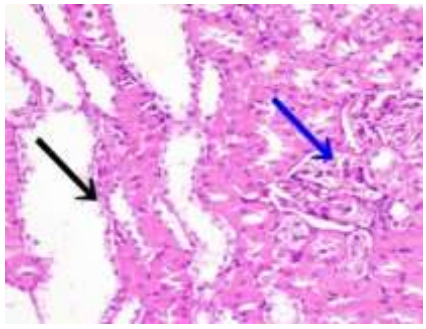


Photo (7): Photomicrograph of kidney of rat from group 2 showing severe vacuolar degeneration of epithelial lining renal tubules (black arrow) and congestion of glomerular tuft (blue arrow) (H & E X 200).

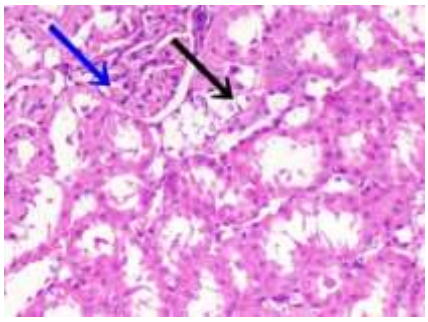


Photo (8): Photomicrograph of kidney of rat from group 3 showing vacuolar degeneration of epithelial lining some renal tubules (black arrow) and slight congestion of glomerular tuft (blue arrow) (H & E X 200).

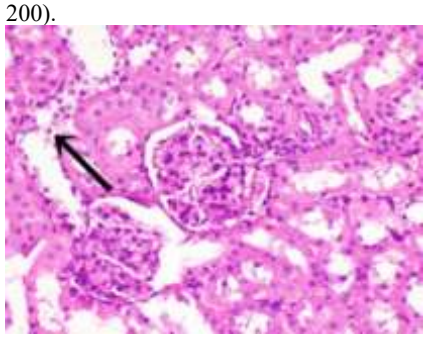


Photo (9): Photomicrograph of kidney of rat from group 4 showing mild vacuolar degeneration of epithelial lining sporadic renal tubules (black arrow) (H & E X 200).

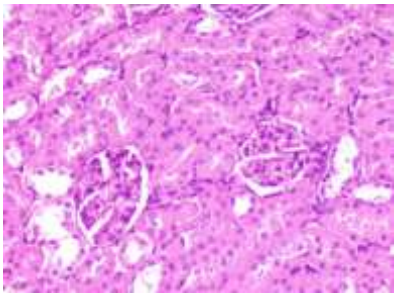


Photo (10): Photomicrograph of kidney of rat from group 5 showing no histopathological lesions (H & E X 200).

These results are consistent with **Lamia *et al.*, (2021)** reported that rats given CCl_4 indicated liver and kidney damage as well as infiltration of inflammatory and mononuclear cells.

Thus **Eric & Adolphu (2020)** revealed that CCL_4 causes serious histological alterations, including fatty changes, severe hepatocellular degeneration and necrosis, congestion, sinusoidal dilatation, and infiltration of inflammatory cells in the hepatic tissues. It was also noted that major hemorrhage edema, hyperemia, acute tubular necrosis, and degenerative alterations of tubular cells were reported in the kidneys.

Turturică & Bahrim (2021) highlighted the possibility that regular use of ethanolic carrot seed extracts can improve the liver tissue's antioxidant activity.

Additionally, carrot seed extract is a dietary source of natural antioxidants that promote health and prevent disease. The Food and Drug Administration has approved it as "generally regarded as safe" when consumed in trace amounts as a flavoring or food additive (**Katiyar *et al.*, 2024**).

conclusion

In conclusion, the findings of the current study suggest that carrot seed extract could afford a significant protective action in the alleviation of CCl_4-induced liver and kidney injury.

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التأثير العلاجي لمستخلص بذور الجزر (*Daucus carota L.*) علي إصابة الكبد والكلي برابع كلوريد الكربون في فئران التجارب

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الملخص العربي

تهدف هذه الدراسة إلي معرفة تأثير مستخلص بذور الجزر علي إصابة الكبد والكلي الناجمة عنCCL_4 في فئران التجارب. تم استخدام ثلاثون فأرا من ذكور الفئران البالغة, وتم تقسيمهم عشوائيا الى مجموعتين رئيسيتين بعد فترة التأقلم المجموعة الاولى (العدد = ٦فئران) وتعتبر المجموعة الضابطة السالبه بينما تم حقن العدد المتبقى من الفئران (العدد = ٢٤ فأرا) بـ CCl_4 في زيت البارافين (٥٠٪ حجم / حجم ٢ مل / كجم من وزن الجسم) مرتين في الأسبوع لمدة أسبوعين. بعد حقن الفئران تم تقسيمهم الى أربع مجموعات فرعية كل مجموعه بها ٦فئران. المجموعه الفرعية الاولى تعتبر مجموعه ضابطة موجبة. تم تغذية باقى المجموعات على نسب مختلفة من مستخلص بذور الجزر ٥٠و١٠٠و٢٠٠ ملجم/كجم من وزن الجسم علي التوالي. فى نهاية فترة التجربة (٦أسابيع) تم قياس وظائف الكبد ووظائف الكلى ومستوي الدهون وتم اجراء الفحوص النسيجية للكبد والكلى. أشارت النتائج إلى أن وظائف الكبد في المجموعات ٣ و٤ و٥ كانت أقل من المجموعة الضابطة الموجبة. وبالمقارنة مع المجموعة الضابطة الموجبة ، أظهرت جميع المجموعات تحسنًا ملحوظًا في وظائف الكلى والكوليسترول ومستوى الدهون. وقد تحسنت نتائج الفحوصات النسيجية المرتبطة بالدراسة الكيميائية الحيوية بشكل ملحوظ مع إضافة مستخلص بذور الجزر. هذه الدراسة تقترح إلى أن مستخلص بذور الجزر قد يكون مفيدًا للمرضي الذين يعانوا من امراض الكبد والكلى.

الكلمات المفتاحية: مستخلص بذور الجزر، وظائف الكبد، وظائف الكلى، مستوى الدهون، رابع كلوريد الكربون.