



Therapeutic Effects of Gymnema (*Gymnema sylvestre*) and Sea Grape (*Coccoloba uvifera* L.) on Carbon Tetrachloride Induced Hepatotoxicity in Rats



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THIS investigation aimed to study the effect of gymnema (*Gymnema sylvestre*) and sea grape (*Coccoloba uvifera* L.) on carbon tetrachloride (CCl₄) induced hepatotoxicity in rats. Thirty male albino rats weighing 150±5g were divided into 6 equal groups (n=5 rats), one group kept as control negative, while the other 5 groups injected s/c by CCl₄ in olive oil 50% V/V (2mL / kg b.wt.) twice a week for two weeks for liver intoxication incidence, one of them left as (C +ve) while the rest four groups orally administered using two doses 5 & 10% of gymnema and sea grape each. At the end of experimental period (45 days), blood samples were collected for serum separation to determine serum liver enzymes, total cholesterol, triglycerides, atherosclerosis index, lipoprotein fractions and kidney functions. The obtained results demonstrated that gymnema and sea grape at two doses 5 & 10%, especially at high dose for each herb caused significant improvement in liver enzymes, lipid profile, serum glucose and kidney functions in hepatotoxic rats. According to the results, gymnema and sea grape could improve the levels of liver enzymes, lipid profiles, glucose and kidney functions in CCl₄ induced hepatotoxicity in rats.

Keywords: Hepatotoxicity, Sea grape, Gymnema.

Introduction

Chronic liver damage is a worldwide common pathology, characterized by inflammation and fibrotic process that leads to a progressive evolution from chronic hepatitis to cirrhosis and hepatocellular carcinoma. A major role for fats and oxidative stress has been recently demonstrated in the pathogenesis of liver diseases (Filomena et al., 2008)

Gymnema sylvestre belongs to family asclepidaceae, is a native plant in south west of India, Australia and Africa. It is also known as meshashringi in sanskrit, in Hindi: Gurmar, Kanada: Sannagerasehabmu and Telugu: Podapatri. From ancient times it is used to treat diabetes, hypercholesterolemia, asthma, eye complications and inflammation (Subramaniyan et al., 2014). Flavonoids, tannins, alkaloids, phenols, cinnamic

acid, folic acid, ascorbic acid, butyric acid, tartaric acid, all these types of antioxidants are present in *Gymnema sylvestre* (Suparna and Santanu, 2019)

Sea grape (*Coccoloba uvifera*) is a collective term for the edible varieties of the green seaweed genus *Caulerpa* and the chemical composition as follows: α-Amyrin, chrysophanol, emodin, physcion, rhein, royleanone and beta-sitosterol which make it as a (hypoglycemic, hypolipidemic, hypocholesterolemic and hepatoprotective) (Jessica et al., 2015).

According to the importance of using the herbs for healing liver intoxication, this investigation aimed to study the effect of gymnema (*Gymnema sylvestre*) and sea grape (*Coccoloba uvifera* L.) on carbon tetrachloride induced hepatotoxicity in rats.

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Materials and Methods

Materials

Herbs

The tested herbs in the investigation were gymnema (*Gymnema sylvestre*) and sea grape (*Coccoloba uvifera L.*) which were bought from Harraz herbs store, Cairo, Egypt.

Rats

Thirty Sprague-Dawley male albino rats weighing 150 ± 5 g. b.wt. were purchased from Laboratory of Animal Colony, Helwan, Egypt.

Basal diet

Basal diet for rats included all the following nutrients, casein, sucrose, corn oil, choline chloride, vitamins mixture, mineral mixture, cellulose, and corn starch which purchased from El-Gomhoria company, Cairo, Egypt.

Carbon tetrachloride (CCl₄)

Carbon tetrachloride (CCl₄) was obtained from El-Gomhoria Company for Chemical Industries, Cairo, Egypt, as 10% liquid solution as a toxic chemical material for liver poisoning.

Methods

Experimental design

All rats were fed on basal diet for 7 consecutive days before the beginning of the experiment for adaptation in Ophthalmology Hospital, Giza. Rats were divided into two main groups (n= 5 rats). The first main group fed on basal diet and left as a negative control group. The second main Groups injected subcutaneous (s/c) by CCl₄ in olive oil 50% V/V (2ml / kg b.wt.) twice a week for two weeks to induce chronic intoxication of the liver according to the method described by Jayasekhar et al. (1997), then divided into five equal groups (n= 5 rats), one of them left as control positive group (C +ve) while the rest four groups orally administered using two doses of 5 & 10% of gymnema and sea grape individually for each of them for 28 days as a period suggested for treatment.

Biochemical analysis

At the end of the total experimental period (45 days), blood samples were collected for serum separation to determine the following parameters: Serum liver enzymes (ALT, AST) according to Suzuki (1976) and ALP according to Belfield and Goldberg (1971), total cholesterol according to Allen (1974), triglycerides according to Fossati and Prencipe (1982), lipoprotein fractions (HDLc and LDLc) according to Herrmann et al. (1983),

VLDL was calculated as triglycerides/5 and atherogenic index (AI) was calculated according to Kikuchi et al. (1998) as a sum of LDL plus VLDL divided by HDL. Total bilirubin was determined due to the method of Doumas & Wu (1991), direct and indirect bilirubin was measured according to Sepulveda and Osterberg (1943). Serum total protein (TP) determined according to the test of Buzanovskii (2017), albumin was carried out as the method of Doumas et al., (1971) and globulin was calculated as Charry and Sharma (2004). Serum glucose was determined according to Kaplan (1984). Creatinine, urea and uric acid were determined according to Nathan and Donald (1975), (Charles and Crouch, 1977) and (Kageyama, 1971), respectively.

Statistical analysis

Statistical significance tests were performed using SPSS (v.20, IBM SPSS Statistics, US) at $p < 0.05$ by means of one-way analysis of variance (ANOVA) followed by LSD post hoc multiple comparisons.

Results and Discussion

Effect of gymnema and sea grape on liver enzymes

Data illustrated in Table 1 show the effect of gymnema and sea grape at two doses each (5 & 10%) on serum liver enzymes including aspartate amino transaminase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP) enzymes and AST/ALT in carbon tetrachloride-intoxicated rats.

It is clear from the table that intoxicated rats with carbon tetrachloride without treatment (C +ve) that the Mean \pm SE for serum levels of AST, ALT, ALP and AST/ALT enzymes were 163.00 ± 5.17 , 56.00 ± 3.01 , 290.00 ± 2.18 and 2.91 ± 0.05 U/L, respectively, ($P < 0.05$), while in control negative group were 30.00 ± 2.05 , 17.00 ± 1.03 , 63.00 ± 1.79 and 1.77 ± 0.02 U/L, respectively. These data demonstrated that there were significant increases of AST, ALT, ALP and AST/ALT enzymes in the serum of rats inflicted with carbon tetrachloride when compared to normal rats. All groups injected by carbon tetrachloride then orally fed by sea grape 5&10% and gymnema 5&10% showed significant decrease in serum levels of all previously mentioned parameters when compared to control positive group. Rats with liver intoxication by carbon tetrachloride then orally fed on gymnema 10% as one of treated groups showed the highest significant decrease in AST, ALT, ALP and AST/ALT when compared to all other treated groups.

TABLE 1. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on serum levels of aspartate amino transaminase (AST), alanine amino transferase (ALT) and alkaline phosphatase (ALP) enzymes in carbon tetrachloride intoxicated rats.

Parameters	AST (U/L)	ALT (U/L)	AST/ALT	ALP (U/L)
Groups				
Control -ve	30.00±2.05 ^c	17.00±1.03 ^e	1.77±0.02 ^b	63.00±1.79 ^f
Control +ve	163.00±5.17 ^a	56.00±3.01 ^a	2.91±0.05 ^a	290.00±2.18 ^a
Gymnema 5%	28.00±1.89 ^d	18.00±1.07 ^d	1.56±0.07 ^e	90.00±2.18 ^c
Gymnema 10%	26.00±1.05 ^e	17.00±0.98 ^e	1.53±0.02 ^f	71.00±1.83 ^e
Sea grape 5%	33.00±3.12 ^b	20.00±1.19 ^b	1.65±0.03 ^c	94.00±1.08 ^b
Sea grape 10%	30.00±2.17 ^c	19.00±1.85 ^c	1.58±0.03 ^d	75.00±2.05 ^d

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b,c,d, etc.,) in the same column differ significantly at $p \leq 0.05$ using one-way ANOVA test, while those with similar letters are not.

These results confirmed by the findings of Venkatakishore et al. (2016) who concluded that *Gymnema sylvestre* extract was effective for the prevention of CCl₄ and paracetamol induced hepatic damage in rats, confirming that the hepatoprotective effect related to the inhibition of lipid peroxidation. Furthermore, *G. sylvestre* contains triterpene saponins related to oleanane and dammarane. Meanwhile, the major constituents like gymnemic acids and gymnema saponins which are members of oleanane type of saponins while gymnemasides are dammarane saponins (Foster, 2002 and Khramov, et al., 2008). Other phytoconstituents include anthraquinones, flavones, phytin, resins, tartaric acid, formic acid, butyric acid, lupeol, β -amyryn related glycosides, and calcium oxalate (Sinsheimer, et al., 1970).

Effect of gymnema and sea grape on serum total cholesterol and triglycerides

The effect of orally feeding with gymnema and sea grape at two doses each (5 & 10%) on serum levels of total cholesterol and triglycerides in carbon tetrachloride intoxicated rats is recorded in Table 2.

It could be concluded from the results that in control positive group, rats injected with carbon tetrachloride without treatment, the Mean ± SE of the serum levels for total cholesterol and triglycerides were 190.00±5.17 and 154.00±4.13 mg/dL, compared to 120.00±3.12 and 120.00±2.91 mg/dL in control negative group (normal rats). The obtained data showed that there was significant increase in serum levels of total cholesterol and triglycerides in rats poisoned by

carbon tetrachloride without treatment (C +ve) when compared to normal rats (C -ve). All rats poisoned by carbon tetrachloride then orally fed on gymnema and sea grape at twice doses (5 & 10%) showed significant decrease in serum levels of total cholesterol and triglycerides when compared to control positive group. Rats with liver intoxication by carbon tetrachloride then orally fed with sea grape 10% as one of treated groups showed the highest significant decrease in total cholesterol and triglycerides when compared to all other treated groups.

The obtained results agreed with the results of Sunila and Anoop (2009) who concluded that *Gymnema sylvestre* used in the treatment of obesity and hypercholesterolemia. Moreover, Shigematsu et al., (2001) showed that serum lipids were normalized by the leaf extract of *Gymnema sylvestre*, when orally fed for 10 weeks using rats receiving a high fat diet and decreasing in triglycerides in the rats receiving a normal fat diet. Also, Vijayanand et al., (2012) declared that *Gymnema sylvestre* extract was effective in decreasing the serum lipids which the hypolipidemic effect may be due to an increase in insulin secretion that ultimately led to a decrease in the synthesis of cholesterol and fatty acids.

Effect of gymnema and sea grape on lipoprotein fractions

Data presented in Table 3 show the effect of orally fed with gymnema and sea grape at two doses each (5 & 10%) on the levels of lipoprotein fraction (HDLc, LDLc and VLDLc) and atherosclerosis index in carbon tetrachloride intoxicated rats.

TABLE 2. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on serum levels of total cholesterol and triglycerides in Carbon tetrachloride intoxicated rats.

Parameters	T.C (mg/dL)	T.G (mg/dL)
Groups		
Control -ve	120.00±3.12 e	120.00±2.91 e
Control +ve	190.00±5.17 a	154.00±4.13 a
Gymnema 5%	145.00±3.53 b	148.00±3.35 b
Gymnema 10%	136.00±4.17 c	145.00±4.02 b
Sea grape 5%	131.00±2.98 d	136.00±5.11 c
Sea grape 10%	122.00±4.19 e	127.00±4.89 d

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b,c,d, etc.,) in the same column differ significantly at $p \leq 0.05$ using one-way ANOVA test, while those with similar letters are not.

TABLE 3. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on the levels of lipoprotein fractions (HDLc, LDLc and VLDLc) and AI in carbon tetrachloride intoxicated rats.

Parameters	HDLc (g/dL)	LDLc (g/dL)	VLDLc (g/dL)	AI
Groups				
Control -ve	55.00±1.91 c	41.00±0.81 e	24.00±1.18 f	1.18±0.05 d
Control +ve	40.00±2.81 e	119.00±2.17 a	30.80±2.05 a	3.75±0.09 a
Gymnema 5%	54.00±1.18 cd	61.00±1.73 b	29.60±0.53 b	1.68±0.07 b
Gymnema 10%	52.00±1.56 d	55.00±0.98 c	29.00±1.07 c	1.62±0.04 c
Sea grape 5%	60.00±3.17 b	44.00±1.13 d	27.20±1.12 d	1.19±0.03 d
Sea grape 10%	65.00±2.99 a	32.00±1.52 f	25.40±0.98 e	0.88±0.03 e

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b,c,d, etc.,) in the same column differ significantly at $p \leq 0.05$ using one-way ANOVA test, while those with similar letters are not.

It could be noticed that in rats intoxicated with carbon tetrachloride without treatment that the Mean±SE for serum levels of HDLc, LDLc and VLDLc were 40.00±2.81, 119.00±2.17 and 30.80±2.05 mg/dL, respectively, while in normal rats were 55.00±1.91, 41.00±0.81 and 24.00±1.18 mg/dL, respectively. Moreover, atherosclerosis index for control positive group was 3.75±0.09 mg/dL as compared to 1.18±0.05 mg/dL for control negative one. These findings denote that there was significant decrease in HDLc but at the same time significant increase in LDLc, VLDLc and AI of rats poisoned by carbon tetrachloride without treatment as compared to the control -ve (normal rats). All groups intoxicated by carbon tetrachloride then orally fed on gymnema and sea grape at two doses reflected significant increase in (HDL-c) while significant decrease in low and very low-density lipoprotein, at the same

time, significant decrease in AI as compared to control positive group. Rats poisoned by carbon tetrachloride then orally fed on sea grape 10% showed the highest significant increase in HDL, as well as, the highest significant decreases in LDL, vLDL and AI when compared to all treated groups.

These findings supported by a clinical trial of Preuss et al. (2004) who studied *Gymnema sylvestre* extract at a dose of 400mg/day along with hydroxyl citric acid and niacin bound chromium given to moderately obese individuals for eight weeks which decreased TC, LDL-C and TG contents significantly, with increased serum HDL-C. Furthermore, Suparna and Santanu (2019) reported that *Gymnema sylvestre* biocomponents possess both antidiabetic and antioxidant activities with their antidiabetic features also.

Effect of gymnema and sea grape on total bilirubin, direct and indirect bilirubin

Table 4 shows the effect of orally fed with gymnema and sea grape at two doses each (5 & 10%) on total bilirubin (T.B), direct bilirubin (D.B) and indirect bilirubin (I.B) of carbon tetrachloride-intoxicated rats.

It is clear from the Table 4 that the Mean±SE of serum levels of total bilirubin (T.B), direct (D.B) and indirect bilirubin (I.B) in rats intoxicated with carbon tetrachloride without treatment (c +ve) were 0.31±0.007, 0.12±0.005 and 0.19±0.007 U/L, while in normal rats were 0.18±0.002, 0.08±0.001 and 0.10±0.002 mg/dL, respectively. These findings denote that there were significant increases in serum levels of T.B, D.B and I.B for control positive groups as compared to control negative ones. All rats intoxicated by carbon tetrachloride then orally fed on gymnema and sea grape at two doses reflected significant decrease in all previously mentioned parameters as compared to (C +ve) rats. The group poisoned by carbon tetrachloride then orally fed on sea grape 10% showed the highest significant decrease in T.B, D.B and I.B when compared to all treated groups. Moreover, there was non-significant difference between rats intoxicated with carbon tetrachloride then orally fed with sea grape 10% and control -ve group (normal rats) for D.B which was 0.08±0.002 and 0.08±0.00 mg/dl, respectively. Accordingly, the presence of alkaloids was detected in plant extract Leaves of *G. sylvestre* have acidic glycosides and anthraquinones and their derivatives (Dateo and Long, 1973).

Effect of gymnema and sea grape on total protein, albumin, globulin and albumin/globulin

Table 5 shows the effect of orally fed with gymnema and sea grape at two doses each (5 & 10%) on total protein (T.P), albumin (Alb.), globulin (Glob.) and albumin/globulin (A/G) in carbon tetrachloride-intoxicated rats.

It could be observed that there was significant decrease in the serum levels of total protein (T.P), albumin (Alb.), globulin (Glob.) and albumin/globulin (A/G) for control positive groups when compared to control negative ones which the Mean±SE were 3.50±0.21 and 8.40±0.13 g/dl for T.P, 2.00±0.05 and 4.90±0.03 g/dl for Alb., 1.50±0.02 and 3.50±0.05 g/dL for Glob. and 1.33±0.005 and 1.40±0.007 for A/G. All experimented groups intoxicated by carbon tetrachloride then orally fed on gymnema and sea grape at two tested doses showed significant increase in T.P, Alb., Glob., and A/G when compared to (C +ve). Furthermore, the group of rats intoxicated with carbon tetrachloride then orally fed with a dose of 10% gymnema showed the highest significant increases in total protein (T.P), albumin (Alb.) and globulin (Glob.) when compared to all treated groups, while the group orally fed with a dose of 10% sea grape showed the highest significant increases in albumin/globulin (A/G) when compared to not only all treated groups but also control negative.

These data agree with the findings of Bhagyajyothi et al. (2018) who found significant correlation between serum protein fractions in all the treated groups, and the higher dose of *Gymnema sylvestre* extract showing excellent correlation comparable with globulin.

TABLE 4. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on total bilirubin (T.B), direct (D.B) and indirect bilirubin (I.B) in carbon tetrachloride-intoxicated rats.

Parameters	T.B (mg/dl)	D.B (mg/dl)	I.B (mg/dl)
Groups			
Control -ve	0.18±0.002 f	0.08±0.001 c	0.10±0.002 e
Control +ve	0.31±0.007 a	0.12±0.005 a	0.19±0.007 a
Gymnema 5%	0.30±0.005 b	0.12±0.003 a	0.18±0.003 b
Gymnema 10%	0.29±0.004 c	0.12±0.005 a	0.17±0.005 c
Sea grape 5%	0.28±0.005 d	0.10±0.002 b	0.18±0.004 b
Sea grape 10%	0.24±0.003 e	0.08±0.002 c	0.16±0.003 d

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b, c, d, etc.) in the same column differ significantly at $p \leq 0.05$ using one-way ANOVA test, while those with similar letters are not.

TABLE 5. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on total protein (T.P), albumin (Alb.), globulin (Glob.) and albumin/globulin (A/G) in carbon tetrachlorideintoxicated rats.

Parameters	T.P (g/dL)	Alb. (g/dL)	Glob. (g/dL)	A/G
Groups				
Control -ve	8.40±0.13 a	4.90±0.03 a	3.50±0.05 a	1.40±0.007 d
Control +ve	3.50±0.21 e	2.00±0.05 d	1.50±0.02 e	1.33±0.005 e
Gymnema 5%	7.60±0.07 c	4.70±0.07 b	2.90±0.03 bc	1.62±0.009 b
Gymnema 10%	7.90±0.10 b	4.90±0.03 a	3.00±0.03 b	1.63±0.003 b
Sea grape 5%	6.90±0.11 d	4.10±0.04 c	2.80±0.07 c	1.46±0.002 c
Sea grape 10%	7.00±0.09 d	4.60±0.02 b	2.40±0.05 d	1.97±0.003 a

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b,c,d, etc.,) in the same column differ significantly at $p \leq 0.05$ using one. way ANOVA test, while those with similar letters are not.

Effect of gymnema and sea grape on serum glucose

The results recorded in Table 6 show the effect of orally fed with gymnema and sea grape at two doses each (5 & 10%) on serum glucose in carbon tetrachloride-intoxicated rats.

It is clear from the previous table that the Mean ± SE of serum glucose level was 200.00±5.12 mg/dL in rats intoxicated with carbon tetrachloride without treatment (Positive group), while in control negative group was 101.00±3.07 mg/dl. These data showed that there was a significant increase in serum glucose level in (C +ve) as compared to (C -ve) group. All groups intoxicated by carbon tetrachloride then orally fed on gymnema and sea grape at two doses (5 & 10%) reflected significant decrease in serum glucose levels when compared to control positive group. At the same time, the highest significant decrease was recorded in sea grape at a dose of 10% when compared to not only with all treated groups but also normal group.

These data are confirmed by the findings of Grijesh et al. (2009) who reported that *Gymnema sylvestre* plant leaves improve the enzyme activity responsible for glucose uptake and utilization and moreover increases the permeability of cells to insulin. Moreover, Suparna and Santanu (2019) listed the hypoglycemic effects of gymnemic acids as it increases insulin secretion from cells, promotes regeneration of islets cells, increases glucose utilization in cells, increases the activities of enzymes responsible for utilization of glucose by insulin dependent pathways, decreases gluconeogenic enzymes and sorbitol

dehydrogenase and causes inhibition of glucose absorption from intestine. Moreover, gymnemic acid binds to the receptor on the intestine and stop glucose molecule from binding to the receptor preventing excess glucose absorption. Also, *Gymnema sylvestre* extract (GSE), possessed hypoglycemic and hypolipidemic activity in long-term treatment and capable of regenerating β cells and hence it could be used as a drug for treating diabetes mellitus (Vijayanand et al., 2012).

Effect of gymnema and sea grape on kidney functions

Table 7 shows the effect of orally feeding with gymnema and sea grape at two doses each (5 & 10%) on kidney functions (creatinine, urea and uric acid) in carbon tetrachloride intoxicated rats.

It is clear from the table that, rats intoxicated with carbon tetrachloride without treatment (C +ve), the Mean ± SE of serum levels of creatinine, urea and uric acid were 2.80±0.09, 87.00±2.09 and 5.10±0.05 mg/dL, respectively, while in (C -ve) normal rats, were 0.56±0.05, 25.00±1.02 and 2.20±0.03 mg/dL, respectively. These findings show that there were significant increases in serum levels of creatinine, urea and uric acid of (C +ve) as compared to (C -ve) groups. All experimental groups injected by carbon tetrachloride then orally fed by sea grape 5&10% and gymnema at the same doses showed significant decrease in serum levels of serum levels of creatinine, urea and uric acid as compared to control positive group, recording the highest decrease for sea grape 10% for creatinine and gymnema 10% for urea and uric acid.

TABLE 6. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on serum glucose in carbon tetrachloride-intoxicated rats.

Parameters	Glucose (mg/dL)
Groups	
Control -ve	101.00±3.07 b
Control +ve	200.00±5.12 a
Gymnema 5%	87.00±1.05 d
Gymnema 10%	84.00±2.13 e
Sea grape 5%	98.00±1.89 c
Sea grape 10%	79.00±2.03 f

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b,c,d, etc..) in the same column differ significantly at $p \leq 0.05$ using one. way ANOVA test, while those with similar letters are not.

TABLE 7. Effect of orally fed with gymnema and sea grape at doses of 5 and 10% on kidney functions (Creatinine, Urea and Uric acid) in Carbon tetrachloride intoxicated rats.

Parameters	Creatinine (mg/dL)	Urea (mg/dL)	Uric Acid (mg/dL)
Groups	Mean ± SE	Mean ± SE	Mean ± SE
Control -ve	0.56±0.05 f	25.00±1.02 e	2.20±0.03 d
Control +ve	2.80±0.09 a	87.00±2.09 a	5.10±0.05 a
Gymnema 5%	0.94±0.07 c	28.00±1.12 d	2.20±0.03 d
Gymnema 10%	0.81±0.05 d	20.00±1.84 f	2.10±0.02 e
Sea grape 5%	1.10±0.01 b	44.00±1.36 b	2.90±0.09 b
Sea grape 10%	0.70±0.01 e	35.00±1.71 c	2.40±0.04 c

- Values denote arithmetic means ± standard error of the mean.

- Different letters (a, b,c,d, etc..) in the same column differ significantly at $p \leq 0.05$ using one. way ANOVA test, while those with similar letters are not.

These results were consistent with Suparna and Santanu (2019) who demonstrated that *Gymnema sylvestre* contains a lot of antioxidants types resulting as a renal protection. Moreover, Jessica et al. (2015) mentioned that sea grape (*Coccoloba uvifera*) contains α -Amyrin, chrysophanol, emodin, physcion, rhein, royleanone and beta-sitosterol which makes it as hypoglycemic, hypolipidemic, hypocholesterolemic hepatoprotective and renal protection.

Conclusion

According to the results, gymnema and sea grape could be used for the treatment of intoxicated liver and improve the levels of liver enzymes, lipid profile, serum glucose and kidney functions in carbon tetrachloride intoxicated rats.

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التأثيرات العلاجية للجيمنيما وعنب البحر على التسمم الكبدى برابع كلوريد الكربون في الفئران

استهدف العمل دراسة تأثير كلا من الجيمنيما وعنب البحر على التسمم الكبدى برابع كلوريد الكربون في الفئران. تم استخدام ٣٠ فأراً أبيض ذات أوزان 150 ± 5 جرام. وتم تقسيم الفئران الى ١ مجموعات متساوية (كل مجموعة ٥ فئران) وتركت الاولى كمجموعة ضابطة سالبة (الطبيعية) بينما الخمس مجموعات الباقية فتم حقنها تحت الجلد باستخدام رابع كلوريد الكربون المحلول مع زيت البرافين ٥٠٪ بالحجم بنسبة ٢مل/كجم من وزن الجسم مرتين أسبوعياً لمدة أسبوعين لإحداث تسمم كبدى. تم تقسيم الفئران المصابة بالتسمم الكبدى الى خمس مجموعات تركت احداها كمجموعه ضابطة موجبة أما الاربع مجموعات المتبقية فتم معالجتهم بالجيمنيما وعنب البحر جرعتين ٥ و ١٠٪ لكل منهما. وفى نهاية التجربة (٤٥ يوم) تم جمع عينات الدم وفصل السيرم وتقدير انزيمات الكبد والكوليسترول والجلسريدات الثلاثية ودليل الاصابة بتصلب الشرايين والليبوبروتينات وجلوكوز السيرم ووظائف الكلى. أظهرت النتائج المتحصل عليها أن كلتا الجرعتين من الجيمنيما وعنب البحر أحدثتا تحسناً معنوياً خاصة في الجرعات الأعلى في انزيمات الكبد والكوليسترول والجلسريدات الثلاثية ومعدل الاصابة بتصلب الشرايين والليبوبروتينات ومستوى جلوكوز السيرم ووظائف الكلى للفئران المصابة بالتسمم الكبدى باستخدام رابع كلوريد الكربون. وبذلك يمكن استخدام الجيمنيما وعنب البحر في علاج التسمم الكبدى وتحسين انزيمات الكبد ودهون السيرم والجلوكوز ووظائف الكلى لدى الفئران المصابة بالتسمم الكبدى برابع كلوريد الكربون.