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Abstract

This study examined the protective effect of portulaca oleracea leaves extract against lead toxicity in experimental rats during the growth period. Twenty-eight albino rats randomly divided to four groups, 7 rats in each group. First group G1 feed on the basal diet, considered as negative control group. Rest of the rats 21 rats were exposed to lead toxicity using lead acetate at a 200 mg/kg diet, classified to three groups. Second group G2 untreated rats were fed only the diet contained lead acetate as a positive control group, third and fourth groups G3 and G4 rats were fed a diet contained lead acetate and treated with daily intraperitoneally ethanol extract of portulaca oleracea at 1 g/kg b.w and 2 g/kg b.w respectively. The experiment period was 6 weeks. Results of the study showed a significantly increasing in indicators of liver and kidney functions, lipid profile and lipid peroxidation. Rats treated with portulaca oleracea extract showed a noticeable improvement in liver functions as evidenced by a significantly reducing in liver enzymes as well as a reduction in total cholesterol and triglycerides in serum. Improvements in kidney functions were also shown in all examined groups comparing to G2 by a significantly decreasing in urea and creatinine levels. Lead administration caused a significantly reduction in antioxidant enzymes activities associated with increasing MDA level. On the contrary, portulaca oleracea extract treated groups showed improvement in antioxidant activity. It can be concluded that portulaca oleracea extract showed a significantly protection against lead toxicity. The improvement was evident in the changes induced by exposure to lead acetate in the groups of rats that treated with portulaca oleracea extract. Results scientifically proved that portulaca oleracea leaves have significant therapeutic effects against intoxication caused by lead acetate. Portulaca oleracea have potential health benefits as a functional supplement that has a role in liver and renal protection and enhancing the antioxidant system against lead toxicity.

Key words: heavy metals intoxication, liver functions, kidney functions antioxidant activity.

التأثيرات الوقائية لمستخلص أوراق الرجلة ضد التسمم بالرصاص في فئران التجارب

الملخص العربي:

تناولت هذه الدراسة التأثير الوقائي لمستخلص أوراق نبات الرجلة ضد سمية الرصاص في فئران التجارب خلال فترة النمو. تم تقسيم ثمانية وعشرون فأراً ألبينو عشوائياً إلى أربع مجموعات، (٧ فئران) في كل مجموعة. المجموعة الأولى G1 تتغذى على الغذاء الأساسي وتعتبر مجموعة ضابطة سالبة. باقي الفئران وعددها (٢١ فأراً) تعرضت للتسمم بالرصاص باستخدام خلات الرصاص بجرعة ٢٠٠ ملغم/كغم في النظام الغذائي، تم تقسيم الفئران إلى ثلاث مجموعات. المجموعة الثانية G2 تغذت الفئران على النظام الغذائي الأساسي المحتوي على خلات الرصاص كمجموعة ضابطة موجبة، المجموعتان الثالثة والرابعة G3 و G4 تغذت الفئران على نظام غذائي يحتوي على خلات الرصاص وحقنها يوميا بمستخلص الرجلة ١ جم/كجم من وزن الجسم و ٢ جم/كجم من وزن الجسم على التوالي. وكانت فترة التجربة ٦ أسابيع. أظهرت نتائج الدراسة زيادة معنوية في مؤشرات وظائف الكبد والكلى ومستوى الدهون وبيروكسيد الدهون. أظهرت مجموعات الفئران المعالجة بمستخلص أوراق الرجلة تحسناً ملحوظاً في وظائف الكبد، ظهر ذلك في انخفاضا معنويًا في مستويات إنزيمات الكبد بالإضافة إلى انخفاض إجمالي الكوليسترول والدهون الثلاثية في مصل الدم. كما كان هناك تحسنًا ملحوظا في وظائف الكلى في جميع المجموعات المعالجة مقارنة بـG2، حيث ظهر انخفاضًا معنويًا في مستويات اليوريا والكرياتينين. تسبب تناول الرصاص في انخفاض ملحوظ في أنشطة الإنزيمات المضادة للأكسدة و المرتبطة بزيادة مستوى MDA. على العكس من ذلك، أظهرت المجموعات المعالجة بمستخلص أوراق الرجلة تحسناً معنويًا في نشاط مضادات الأكسدة. يمكن الاستنتاج أن مستخلص أوراق الرجلة أظهر تأثيرًا وقائيًا ضد التسمم بالرصاص، وكان التحسن واضحاً في التغيرات الناجمة عن التعرض لخلات الرصاص في مجموعات الفئران المعالجة. أثبتت النتائج علمياً أن مستخلص أوراق الرجلة له تأثيرات علاجية كبيرة ضد التسمم الناتج عن خلات الرصاص، فهو يمتلك فوائد صحية كمكمل وظيفي له دور في حماية الكبد والكلى وتعزيز نظام مضادات الأكسدة ضد سمية الرصاص.

الكلمات المفتاحية: التسمم بالمعادن الثقيلة، وظائف الكبد، نشاط مضادات الأكسدة، وظائف الكلى.

Introduction

Contamination of food and animal feed with heavy metals is considered one of the most important problems affecting human and animal health, and thus attracts global attention **(Ye *et al.*, 2009)**. Many environmental pollutants, including heavy metals in animal food, are

usually caused by human behavior or resulting from industrial production, agricultural industries, or intentional and unintentional actions **(Duruibe *et al.*, 2007).** Lead is a heavy metal, highly toxic metal that affects every organ and system in the human body. The main reason for its toxicity is that it interferes with enzyme functions by binding to sulfhydryl groups found in many enzymes, or by imitation of other metals that are a cofactor in many enzymatic reactions **(Rudolph *et al.*, 2003)**.

Lead can cause a variety of damage to the brain and kidneys, eventually leading to death. It can cross the blood-brain barrier by imitating the action of calcium. It also interferes with neurotransmitter pathways and limits the growth of nerve cells in the human body **(Cohen *et al.*, 1981).** Lead cause increasing production of reactive oxygen species. Consequently, this leads to lipid peroxidation, reduced saturated fatty acids and elevating unsaturated fatty acid contents in the membranes. In addition, it enhances the production of reactive oxygen species in many cells as a result of oxidative stress **(Aboul-Enein *et al.*, 2010).** It can affect the central nervous system, liver and kidney functions **(Samuel *et al.*, 2017).** Also it can affect a person at any age, but its effect on children can be more serious, as their childish behaviors make them more vulnerable to lead toxicity (**Nabil *et al.*, 2012).**

Portulaca olerace (common purslane) is an annual succulent plant belongs to the family of Portulacaceae **(Azuka *et al.*, 2014).** It contains higher amounts of omega-3 fatty acids compared to other vegetables. Portulaca olerace is 93.0% water, 3.0% carbohydrates, 2.0 % protein, and contains small percentage of fat. It contains high amounts of vitamin E and vitamin C , with moderate content of several dietary minerals **(Simopoulos, 2013).** It has been considered a medicinal plant for a long time, as it contains good proportions of vitamin A, C, carotenoids and some of B vitamins. The presence of Mg, Ca, K, and Fe in Portulaca olerace were detected. Moreover, it contains two types of betalain alkaloid pigments which is considered antioxidant and anti-mutagenic effects. Studies conducted in laboratories have shown that Portulaca olerace contains anti-inflammatory, anti-bacterial, and anti-fungal substances **(Caballero *et al.*, 2002)**. The study aimed to assess the protective effects of Portulaca olerace leaves extract against lead toxicity in experimental rats during their growth period.

Materials and methods

Materials

Lead acetate, and the kits which were used for biochemical analysis were purchased from El-Gomhoria Company for Trading Drugs, Chemicals and Medical Requirements. Fresh Portulaca oleracea were purchased from domestic market. Twenty eight albino rats (60±5 gm)

were bought from Helwan Farm for Experimental Animals, Cairo, Egypt.

Methods

Preparing the extract of Portulaca oleracea leaves

Fresh Portulaca oleracea leaves were washed well, dried and ground. One liter of 50% ethanol solution added to 100 g of leaves powder and heated with refluxing for 1 hour, the broth filtered and frozen at -20 °C until using. Lyophilization of the preserved filtrate was performed **(Eidi *et al.*, 2015).** The raw yield of lyophilization materials was about 32% (w/w).

Antioxidant activity

The antioxidant activity of portulaca oleracea extract was measured by stable 2, 2-diphenyl-1-picrylhydrazyl radical (DPPH) following the method of **Bandoniene *et al*. (2002).**

Analysis the active chemical constituents

Flavonoids and total phenols in portulaca oleracea extract were estimated according to **Krishnaiah et al. (2009).** Alkaloids was measured following the method of **Harborne (1973).**

Experimental animal design

Twenty-eight albino rats randomly divided to four groups, 7 rats in each group. **First group G1:** feed on the basal diet, considered as negative control group. Rest of the rats (21 rats) were exposed to lead toxicity using Lead acetate at a 200 mg/kg diet according to **Newairy and Abdou (2009)**, and classified to three groups as following:

Second group G2: untreated rats, feed on the diet contained lead acetate as a positive control group.

Third group G3: rats feed a diet contained lead acetate and treated with daily intraperitoneally ethanol extract of Portulaca oleracea at 1 g/kg b.w.

Fourth group G4: rats feed a diet contained lead acetate and treated with daily intraperitoneally ethanol extract of Portulaca oleracea at 2 g/kg b.w.

After end of the experimental period of 6 weeks, body weight gain was evaluated. Rats anesthetized under ether. Blood samples were drawn into clean, dry tubes for centrifugation. The serum was stored at -20 °C in sealed tubes until analyzes were performed.

Biochemical analyses

Liver enzymes including Alanine amino Transaminase (ALT), Aspartate amino Transaminase (AST), Alkaline Phosphatase (ALP) were assessment in serum following **Sherwin (1984), Young (1990)** and **Roy (1970)** respectively. Determination of Cholesterol and Triglycerides in serum were according to **Allain *et al*. (1974)** and **Fossati and Prencipe (1982)** respectively. Levels of Urea and Creatinine were measured by the method of **Fossati *et al.* (1980)** and **Henry (1974)** respectively.

Determination of Malondialdehyde (MDA) in liver homogenates was according the method of **Mihara and Uchiyama (1978).** Determination of Superoxide dismutase (SOD), Catalase and Glutathione peroxidase (GPx) in liver homogenates were according by **Marklund and Marklund (1974), Takahara *et al.* (1960) and Rotruck *et al.* (1973)** respectively**.**

Statistical analysis

The results presented as (mean ± SD). The statistical analyses were performed using SPSS, PC software (Verion 18.0 SPSS Inc., Chieago, USA), Dunk 'test multiple range post-hoc test was used. The results were analyzed by one-way analysis of variance (ANOVA). Values consider a significant difference at P <0.05 **(Snedecor and Cochran, 1980)**.

Results and Discussion

Determination the active compounds in portulaca oleracea extract

Table (1) showed the presence of many active compounds in portulaca oleracea extract such as alkaloid, flavonoid, and phenols. The antioxidants activity of portulaca oleracea extract was 69.5%. Our obtained results were consistent with **(Okafor and Ezejindu. 2014)** who showed that water extract of aerial parts of portulaca oleracea contained steroids, protein, and alkaloids. The results also agreed with **(Al-Moghazy *et al.*,2017),** the study showed the presence of alkaloids, flavonoids, phenols, trepenoids and saponin when analyzing the phytochemicals in purslane extract.

Table (1): Active compounds in portulaca oleracea extract

Active compounds	Portulaca oleracea extract (W/w)
Flavonoids	8.72
Phenol	3.66
Alkaloids	5.16
Antioxidants activity	69.50%

Effect of portulaca oleracea extract on body weight gain in experimental rats

Results in Table (2) showed that body weight gain was significantly reduced in G2 (7.51 g) compared with G1 (25.24 g). Moreover, rats treated with portulaca oleracea extract showed a significantly increasing in body weight gain comparing with G2.

Table (2): Effect of portulaca oleracea extract on body weight gain in experimental rats

Parameter / Group	body weight gain (g)
G1 (- ve control)	25.24 ± 3.7^{a}
G2 (+ve control)	7.51 ± 2.4^{c}

G3 PE (1 g/kg b.w)	19.56± 2.2[b]
G4 PE (2 g/kg b.w)	24.62± 1.9[a]

Values are presented as (mean ± SD). Values with different letters in the same column were significantly differences at P < 0.05. PE: portulaca oleracea extract.

Evaluation the effect of portulaca oleracea extract on liver function in experimental rats.

Data in Table (3) demonstrated the effects of portulaca oleracea extract on liver enzymes in experimental rats. The results showed that ALT level was significantly increased in rats exposed to lead toxicity in G2 at (49.17 U/L) compared with G1(30.42 U/L). The data showed that when rats treated with portulaca oleracea extract a significantly reduction in the levels of ALT were observed comparing with G2. Furthermore, G4 showed the best result in reducing the level of ALT (32.46 U/L).

From the obtained results, showed that AST level was significantly increasing in rats exposed to lead toxicity in G2 at (25.14 U/L) comparing with G1(15.51 U/L). While the results showed that when rats treated with portulaca oleracea extract, a significantly decreasing in the levels of AST was observed comparing with G2. In addition, G4 showed the best results in decreasing the level of AST as (16.76±1U/L).

The results showed that rats exposed to lead toxicity in G2 showed significantly increasing in ALP level at (220.13U/L) comparing with G1 (180.23U/L). Furthermore, when rats treated with portulaca oleracea extract (1g/kg b.w) and (2 g/kg b.w) showed a significantly reducing in the levels of ALP comparing with G2 (197.30 U/L) and (190.57 U/L) respectively.

It is noted from the previous results that lead acetate caused developed liver dysfunction that evident from significantly increasing in the serum activities of liver enzymes ALT, AST, and ALP comparing with negative control group. The results consistent with **(Khan *et al.*, 2008),** as the results of their study showed increased levels of liver enzymes in the serum of rats exposed to lead poisoning. Also, **(Al-Wabel *et al.*, 2007)** confirmed that rats given lead acetate in the diet, showed significantly increasing in liver enzymes. Lead toxicity is related to enzymes that contain functional sulfhydryl groups, causing them to become non-functional and leading to the weakening of oxidative balance **(Ahamed *et al.*, 2005).**

Treatment with portulaca oleracea extract showed significantly improvement in the liver function parameters comparing with positive group. The active compounds present in portulaca oleracea may be the reason for the preventive effect as Flavonoids, Polyphenols, and

Alkaloids. Polyphenol possesses membranes stabilizing activity by inhibiting the formation of reactive oxygen species induced by heavy metals and maintaining the structural integrity of the cell membrane **(Chen *et al.*, 2016).** The study results we obtained are consistent with **(Zheng et al., 2017),** the protective effect of purslane was evaluated in rats with streptozotocin induced diabetes. The results showed significantly decreasing in the levels of AST, ALT, triglyceride and total cholesterol in serum of rats treated with purslane. The study assumed that purslane has an important role in regulating streptozotocin induced liver damage by inhibiting the Rho–NFκB pathway.

Table (3): Effects of portulaca oleracea extract on liver enzymes in experimental rats.

Parameter / Group	ALT (U/L)	AST (U/L)	ALP (U/L)
G1 (- ve control)	30.42± 1.7^{c}	15.51± 2.6^{c}	180.23± 5.7^{d}
G2 (+ve control)	49.17±2.4^{a}	25.14±4.5^{a}	220.13±8.6^{a}
G3 PE (1 g/kg b.w)	34.82±2.7^{bc}	17.80±1.6^{b}	197.30 ±4.5^{b}
G4 PE (2 g/kg b.w)	32.46± 1.9^{b}	16.76±1.5^{bc}	190.57±9.4^{c}

Values are presented as (mean ± SD). Values with different letters in the same column were significantly differences at $P < 0.05$. ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, ALP: Alkaline phosphatase, PE: portulaca oleracea extract.

Effect of portulaca oleracea extract on serum triglycerides and total cholesterol presented in Table (4). The results showed that triglyceride and total cholesterol levels were significantly increasing in G2 at (180.23 mg/dl) and (215.35 mg/dl) respectively. While rats treated with portulaca oleracea extract showed significantly reduction in the levels of triglyceride and cholesterol. The best result were in G4 (90.61 mg /dl) and (189.30 mg /dl) respectively.

The current study indicated that there were a significant increase in total cholesterol and triglyceride levels, this may be due to oxidative stress caused by lead, which leads to an increase in the level of H2O2 and causes impair in fat metabolism and lipid peroxidation, which is associated with heavy metals toxicity **(Bernhoft, 2013).** In addition, **(Kojima *et al.*, 2004)** indicated that oxidative stress may cause significantly increasing in blood cholesterol and triglyceride levels compared to control group of rats as a result of lead toxicity. Changes in gene expression of some liver enzymes such as hydroxyl methyl-glutaryl CoA reductase (HMG-CoA) due to lead toxicity may cause this rise in

blood cholesterol level. Increasing of total cholesterol in serum may be due to liver dysfunction.

Treatment rats with portulaca oleracea extract showed effective protection in lipid peroxidation, which are consistent with **(Sharma, 2015)**. **Jang et al. (2022)** indicated that rats fed on high-cholesterol diet supplemented with 0.8% portulaca oleracea extract for 4 weeks showed significant improvement in serum, liver, and fecal lipid profiles. Portulaca oleracea extract regulated the expressions of genes participate in cholesterol efflux and bile acids' formation such as liver X receptor alpha, ATP-binding cassette subfamily, and cholesterol 7 alpha-hydroxylase, and down regulated farnesoid X receptor in the liver.

Table (4): **Effect of portulaca oleracea extract on serum triglycerides and total cholesterol in experimental rats**

Parameter / Group	Triglycerides (mg/dl)	Total cholesterol (mg/dl)
G1 (- ve control)	45.42 ± 0.8^{c}	180.38 ± 3.1^{c}
G2 (+ve control)	180.23 ± 3.5^{a}	215.35 ± 2.4^{a}
G3 PE (1 g/kg b.w)	95.44 ± 5.2^{b}	193.42 ± 2.1^{b}
G4 PE (2 g/kg b.w)	90.61 ± 4.6^{b}	189.30 ± 1.8^{bc}

Values are presented as (mean ± SD). Values with different letters in the same column were significantly differences at $P < 0.05$. PE: portulaca oleracea extract

Evaluation the effect of portulaca oleracea extract on kidney function in experimental rats.

The results in Table (5) showed that rats which exposed to lead toxicity in G2 exhibited significantly increasing in urea nitrogen levels as (55.37 mg/dl) comparing with G1 (45.32 mg/dl). Groups of the rats treated with portulaca oleracea extract revealed a significantly reducing in levels of urea nitrogen. Moreover, G4 showed the best results in serum urea nitrogen as (45.36 mg/dl).

The results showed that G2 with lead toxicity had increasing in the creatinine levels (0.87 mg/dl) comparing with G1 (0.62 mg/dl). Groups of rats treated with portulaca oleracea extract showed significantly reduction in the levels of creatinine comparing with G2. The best result of creatinine level was in G4 (0.59 mg /dl).

Serum creatinine and urea nitrogen levels are used in the evaluation of renal dysfunction. The elevation in urea nitrogen and creatinine levels in G2 indicates kidney injury due to exposure to lead toxicity. High levels of creatinine in blood is one of the indicators of renal malfunction **(Ahmed**

***et al*., 2006).** Moreover, renal tubular degeneration, glomerular atrophy and interstitial inflammatory cells infiltration occur when rats exposed to toxicity (**El-Shenawy *et al*., 2009)**.

The study results are consistent with (**Nabil *et al*., 2013)** they showed a significantly increasing in urea nitrogen and creatinine levels in the lead toxicity group. High blood creatinine concentration indicates the inability of the kidneys to excrete this compound **(Overu *et al*., 2004).** The results were in agreement with **(Abd El Rahiem *et al*., 2007)** who clarified that lead acetate causing elevation in serum creatinine comparing with the control group.

A significant improvement in kidney function in the groups of rats treated with portulaca oleracea extract against lead toxicity. Our results consistent with **(Liang *et al.*, 2012)** indicted that portulaca oleracea extract decreased urea nitrogen and creatinine levels after exposure heavy metal. Previous study by **(Barakat and Mahmoud, 2011)** reported that that feeding animals with cholesterol-enriched diet causing a significantly increasing in the levels of kidney function indicators comparing with control group. On the contrary, administration of flax/pumpkin or purslane/pumpkin seeds mixtures revealed significantly decreasing in serum levels of urea, creatinine, sodium and potassium comparing with hypercholesterolemic control group. The best results of reducing levels of urea and creatinine were showed in rats fed purslane/pumpkin mixture seeds.

Table (5): **Effect of portulaca oleracea extract on kidney functions in experimental rats**

Parameter / Group	Urea Nitrogen (mg/dl)	Creatinine (mg/dl)
G1 (- ve control)	45.32± 0.8^{c}	0.62± 0.07^{b}
G2 (+ve control)	55.37± 1.6^{a}	0.87± 0.1^{a}
G3 PE (1 g/kg b.w)	47.93±2.1^{b}	0.70±0.13^{ab}
G4 PE (2 g/kg b.w)	45.36±2.6^{c}	0.59±0.06^{b}

Values are presented as (mean ± SD). Values with different letters in the same column were significantly differences at $P < 0.05$. PE: portulaca oleracea extract

Effect of portulaca oleracea extract on antioxidant status and lipid peroxidation in experimental rats

Results in Table (6) revealed that there were significantly reducing in serum SOD and CAT in G2 as (6.4 U/mg protein) and (3.1U/mg protein), comparing with G1 (9.1 U/mg protein) and (4.6 U/mg protein)

respectively. While, levels of SOD and CAT significantly elevating in G3 and G4 comparing with G2. Furthermore, the best result of SOD and CAT levels were in G4, as (8.5 U/mg protein) and (3.7 U/mg protein) respectively.

It also noticeable, that there were significantly reducing in GPx levels in G2 comparing with G1, as (2.8 U/mg protein) and (7.2 U/mg protein), respectively. On the contrary, there was significantly increasing in levels of MDA in G2 (19.3 nmol/mg protein) comparing with G1 (13.4 nmol/mg protein). While treated rats with portulaca oleracea extract exhibited significantly reducing in MDA levels comparing with G2.

It is noted that lead toxicity caused a significantly decreasing in antioxidant enzymes (SOD, CAT, Gpx) in positive group comparing with negative control group. On the contrary, lead acetate increasing the activities of lipid peroxidation as observed in increasing MDA levels in serum. Rats treated with portulaca oleracea extract showed significantly improvement in antioxidant activity by increasing the levels of SOD, CAT, and GPx and lipid peroxidation.

Superoxide dismutase is one of the basic lines of defense against the free radicals which causing oxidative stress (**Mallikarjuna *et al.*, 2008**). It converts O2 to more stable hydrogen peroxide H2O2, which is enzymatically converted to H2O by CAT and GPx (**Czako *et al.*, 2007**). CAT prevents the oxidative stress from H_2O_2 by stimulate formation of H_2O and O_2 **(Rajeshkumar and Kuttan, 2003).** Increasing levels of MDA reflect the levels of lipid peroxidation damage in liver as it is one of the main lipid peroxidation products **(Ebtisam et *al.*, 2014).**

Evaluating the enzymatic and non-enzymatic antioxidant activities in the study confirms the protective effect of portulaca oleracea against lead induced oxidative stress. Lead toxicity causing significantly reduction in the activity of antioxidants enzymes in treated rats, while pretreatment of rats with flavonoid fractions of diosmin and hesperidin reduce the disturbances that have occurred **(Lamidi *et al.*, 2021).** Also, **(Eshginia and Marjani, 2013)** reported that lead causing many changes in the erythrocyte antioxidant enzymes activity in the young female rats.

Our results showed that rats exposure to lead toxicity and treated with portulaca oleracea showed significantly decreasing in oxidative stress signs comparing with non-treated rats, this may be due to the antioxidant effects of polyphenols present in portulaca oleracea extract which protect cells against free radicals. The antioxidant activity in portulaca oleracea is the main factor of lipid oxidation reduction. The polysaccharide in portulaca oleracea has high antioxidant activity by scavenging the free radicals like nitric oxide, hydroxyl and superoxide radicals **(Fan *et al.*, 2019).**

The results of the study showed a significant improvement in liver and kidney functions in the group of rats exposed to lead toxicity and treated with portulaca oleracea extract. These results may be due to the types of bioactivities of portulaca oleracea, antibacterial, analgesic and anti-inflammatory (**Uddin *et al.*, 2012**). Furthermore the free radicals scavenging activities of portulaca oleracea because of its contents from high levels of total flavonoids **(Dini *et al.*, 2013).**

Table (6): Effect of portulaca oleracea extract on antioxidant status and lipid peroxidation in experimental rats

Parameter / Group	SOD (U/mg protein)	CAT (U/mg protein)	GPx (U/mg protein)	MDA (nmol/mg protein)
G1 (- ve control)	9.1±0.2^{a}	4.6±0.1^{a}	7.2±0.3^{a}	13.4±0.6^{c}
G2 (+ve control)	6.4±0.5^{c}	3.1±0.2^{c}	2.8±0.4^{c}	19.3±0.5^{a}
G3 PE (1 g/kg b.w)	7.7±0.3^{b}	3.4±0.4^{bc}	4.2±0.3^{b}	16.5±0.3^{b}
G4 PE (2 g/kg b.w)	8.5±0.5^{ab}	3.7±0.3^{ab}	4.6±0.3^{b}	15.6±0.2^{b}

Values are presented as (mean ± SD). Values with different letters in the same column were significantly differences at $P < 0.05$. PE: portulaca oleracea extract

It has an antioxidant effects in the cardiovascular system of rats by increasing the SOD activity **(Caballero *et al.*, 2002**). Our results consistent with (**Karimi *et al.*, 2010)** demonstrated that portulaca oleracea has the nephron-protective effect and has a potential effect in healing from acute renal injury caused by nephrotoxins. Portulaca oleracea considering as an excellent source for omega-3 fatty acid which has a big influence in protect against several cardiovascular diseases, and plays a role in maintaining the health of the immune system **(Uddin *et al.*, 2014).**

Conclusion

It could be concluded that administration of lead acetate at a 200 mg/kg diet for 6 weeks caused liver and kidney dysfunction. The obtained results demonstrated the liver and kidney protective effects of portulaca oleracea extract in lead toxicity rats as it restored liver and kidney function to normal. As regard to the antioxidant system, lead administration caused a significantly reduction in antioxidant enzymes activities associated with increasing MDA level in serum. While portulaca oleracea extract treated groups showed improvement in antioxidant activity. Our results suggests that portulaca oleracea extract had protective effect against lead toxicity which may be due to the presence of many active compounds it contains.

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