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Hematological evolution of anti-oxidative effects of *Lipidum sativum* in albino male rats

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Abstract

The current study aimed to investigate the anti-oxidative effects of *Lipidum sativum* agonist poisonous mercuric chloride. Total of 60 Swiss male rats were used which allocated into 5 groups; control group (C), mercuric chloride group (M), third, fourth and fifth groups were represented the treatment groups (T1, T2 & T3), each group was divide into two subgroups (21 and 42 days. The blood samples collection by heart puncture for Hematological study. Lepidium sativum extract seed was prepared in doses of 25, 50.100 mg/kg. Results showed in groups that treated with mercury chloride there was decrease in both periods (21 and 42) days in (WBC, RBC, HCT & Hb) and decrease in period of 21 days. In groups that treated with extract of seeds *Lipidum sativum* (100, 50, 25) mg / kg. showed increased in (WBC & RBC) in both periods. In (Hb) there was increase in the 21-days in (T3).In 42-day showed increase in (T2 & T3). In PVC there was increase in the 21-days. In the 42-day period showed increase all groups. Plate let showed increase at 42 days in treated group in (T1& T2). In MCV showed decrease in groups (T1, T2 & T3) at 21 days. In the 42-days showed a reduction in group (T1). The (MCHC) showed decrease in the 21 days and significant increase in (T2). The result concluded that the Lepidium sativum extract seed has improved the blood parameters against toxic effects of mercuric chloride in short and long term.

Keywords: *Lipidum sativum*; Hematological; Mercuric chloride

1. Introduction

Lipidum sativum is the major glucosinolate in seeds and potentially which capable for protecting cells against oxidative stress, protect the body from damages caused by free radical-induced oxidative stress [1]. *Lipidum sativum* contain a wide variety of free radical scavenging molecules such as phenolic compounds (e.g. phenolic acids, flavonoids, anthocyanin's and tannins) [2,3]. *Lipidum sativum* exists in three chemical types: elemental, which is generally used in thermometers and dental amalgam fillings, inorganic compounds that utilize in medicinal products and skin care [4] and organic compounds as methyl mercury (MeHg) dispersed in aquatic ecosystems from the methylation of inorganic and via contaminated seafood and microorganisms [5]. Mercury is a very poisonous heavy metal [6] and it is resulting in a diversity of unfavorable health effects body systems like: urogenital, nervous, respiratory, skin, immune and developmental sequelae [7,8]. Mercury is soaking up through breathing, eating and skin contact, its absorption is associated with the kind of mercury compound and the period of exposure [9]. The most used biomarkers to evaluate the actual exposure to mercury are the mercury determinations on the urine, and also blood [10]. Elemental Mercury and methyl mercury are quickly cross the blood brain barrier and deposit in the central nervous system, inorganic mercury deposition chiefly in the, liver, kidney, spleen, intestine, bone marrow, skin as well as respiratory mucosa [11]. In cases of chronic inorganic mercurial poison, the CNS effects are similar to of those of organic mercury toxin [12]. The

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study was aimed to investigate the anti-oxidative effects of *Lipidum sativum* seed extract against poisonous effects of mercury chloride and in male Rats.

2. Material and Methods

2.1. Study design

A total of 60 Swiss male rats weighing 175 – 325 g were obtained from the Biotechnology Research Center / University of Nahrain. The animals were kept in the animal house of the Research Center in metal cages, under a temperature of 25 °C, ventilation and natural lighting and fed in pellet. The animals were allocated into 5 groups; First group was represented a control (C) group which administered distilled water. Second group was a Mercury chloride (M) which divided in two main subgroups; group of 21 days and 42 days, each group was given mercury chloride (6.6 mg/kg B.W) orally daily for three and six weeks. Third group (T1) was divided in two main sub groups, each group was given mercury chloride (6.6 mg/kg B.W) then intubated orally *Lipidum sativum* (100mg/kg B.W) orally daily for six weeks. Fourth group (T2) was subdivided in two main subgroup, each group which given mercury chloride (6.6 mg/kg B.W) (M) then intubated orally *Lipidum sativum* (50mg/kg B.W) orally daily for six weeks. Fifth group (T3) was subdivided in two main sub groups, each group was given mercury chloride (6.6 mg/kg B.W) (M) then intubated orally *Lipidum sativum* (25mg/kg B.W) orally daily by gavage for six weeks.

2.2. Hematological study

The animals were euthanizing by exposure for chloroform after 21 and 42 days of the experiment after blood collection by heart puncture and a section of the blood was placed in a tube containing an anticoagulant (EDTA).The other part of the blood was kept in gel, followed by centrifugation for 15 minutes at 4000 RPM. Serum was isolated and kept in Eppendorf tubes and frozen at -20 °C until analysis. Hematological parameters include: Total leukocytes count, total erythrocytes count, hemoglobin value (Hb), packed cells volume (PCV), Total Platelet count (PLT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC**)**.

2.3. Preparation of seed extraction

The seeds of *Lipidum sativum* were obtained from commercial sources from Baghdad and the specimen of the plant were deposited to be identified at the College of Agriculture, University of Baghdad under the scientific name (*Lipidum sativum*). Seeds were cleaned of soil and dirt and then powdered via electric blender and kept in a dark glass pot to be ready to utilize. The extract of the seeds was ready via cold maceration method [13]. Detection of total phenolic content and detection of total flavonoid content was on done according to Baby and Malik [14]. Doses preparation for mercury chloride and extract were prepared by dissolving the mercuric chloride in distilled water and dose prepared at 6.6 mg/kg [15. Lepidium sativum extract seed prepared dissolving in distilled water and prepared in doses of 25, 50.100 mg/kg [16].

2.4. Statistical Analysis

Statistical analysis of data was performed using SAS (Statistical Analysis System) version (9.1) (2010). Two-way ANOVA and Least significant differences (LSD) post hoc test were performed to assess significant differences among means. ($P<0.05$) was considered statistically significant.

3. Result

3.1. Result of total white blood cells (WBC)

Results were revealed significant decrease ($P<0.05$) in WBC value after 21 days in (M) group (8.63±0.56) as compared to control group (16.92±1.69) and there was a significant increase ($P<0.05$) in white blood value in groups (T1,T2,T3) those were (15.77±2.21),(16.82±2.23a) and (17.97±1.59) which received *Lipidum sativum* extract Seeds in doses 100,50,25 mg/kg respectively as compared with (Mercury chloride) (8.63±0.56) and control (16.92±1.69) group.. After 42 days, the result revealed significant decrease ($P <0.05$) of WBC value in (M) group (9.38±0.38) as compared to the control group (17.22±1.63). meanwhile the results revealed significant increase ($P <0.05$) in white blood cells value in (T1, T2 & T3) that were (15.82±1.49), (16.10±1.62), (18.72±1.71), respectively, as compared with (M) group (9.38±0.38) and control (17.22±1.63). The levels of relative close of control comparing white blood cells values between periods 21 and 42 days after treatment showed non-significant difference among (M), (T1),(T2) and (T3) groups those were (M group)(8.63±0.56) after 21days &(9.38±0.38) after 42days and (T1) group That was(15.77±2.21) after

21days&(15.82±1.49) after 42 days. Also (T2) group was (16.82±2.23) after 21days & (16.10±1.62) after 42 days and (T3) group was (17.97±1.5) after 21 days & (18.72±1.71) after 42days, Table (1).

3.2. Total Red blood cells (RBCs) Count

Results showed significant decrease (P<0.05) in RBC value after 21 days in (M) group (4.99±0.26) as compared to control group (6.34±0.09), there was a significant increase (P<0.05) RBC value in groups (T1,T2 & T3) which were (6.49±0.33),(6.62±0.40) and (7.40±0.08) which received *Lipidum sativum* extract Seeds in doses 100,50,25 mg/kg respectively as compared with (M) group (4.99±0.26) , and control group (6.34±0.09). After 42 days the results showed significant decrease in RBC value (P <0.05) in (M) group (5.34±0.27) compared to control group (6.21±0.07). There was a significant increase (P<0.05) in RBC value in (T1, T2 & T3) which were (6.61±0.37), (6.87±0.25) and (7.54±0.21) respectively as compared with (Mercury chloride) group (6.21±0.07), and control group (6.21±0.07). Comparing Red blood cell count between periods 21, 42 days after treatment , there was a non-significant difference in (M) (T1) (T2) and (T3) group was (M) group (4.99±0.26) after 21days & (5.34±0.27) after 42days and (T1) group was (6.49±0.33) after 21days& (6.61±0.37) after 42 days. Also (T2) group that was (6.62±0.40) after 21day& (6.87±0.25) after 42 days and (T3) was (7.40±0.08) after 21 days and (7.54±0.21) after 42day, Table (2)

3.3. Hemoglobin concentration (Hb)

The results revealed significant decrease at level (P <0.05) after 21 days in Hemoglobin in group (M) (9.90±0.22) compared to control group (12.25±0.32).There was significant increase (P <0.05) in Hemoglobin concentration in groups (T1, T2 & T3) those were (12.13±0.45), (12.76±0.70), (13.50±0.25) which received *Lipidum sativum* extract seeds in doses 100,50,25 mg/kg respectively, as compared with group (Mercury chloride) and important increase (P <0.05) in (T3) group compared control group (12.25±0.32). After 42 days, there was a non-significant difference in (M) group (10.92±0.78) compared with the control group (11.92±0.34). There was an important increase at (P <0.05) Hemoglobin in (T2, T3) group that was (13.23±0.18),(13.67±0.26) that received *Lipidum sativum* extract Seeds in doses 50,25 mg/kg, respectively, and a non-significant difference in (T1) as compared with (Mercury chloride)group (10.92±0.78) and increase(T2,T3)compared control group (11.92±0.34). Comparing Hemoglobin between periods 21, 42 days after treatment, there was a non-significant difference in (T1, T2 & T3) group. That significant difference was in (M) group (9.90±0.22) after 21days and (10.92±0.78) after 42days and group (T1) that was (12.13±0.45) after 21days & (11.73±0.58) after 42 days. Also (T2) group was (12.76±0.70) after 21days and (13.23±0.18) after 42 days and (T3) group that was (13.50±0.25) after 21 days and (13.67±0.26) after 42days, table (3).

3.4. Hematocrit HCT (PCV) (%) Concentration

Results are shown in Table **{3-5}.** There was an important decrease at (P <0.05) after 21 days in hematocrit HCT concentration recorded in (M) group) (35.15±1.18) as compared with Control group (39.97±0.81) ;there was a non-significant in Hematocrit HCT concentration in groups(T1,T2) that was (39.42±0.76),(39.68±4.19) that received *Lipidum sativum* extract Seeds in doses 100,50, mg/kg, respectively, and an important increase at (P <0.05) (T3) compared with (Mercury) group (35.15±1.18) and control group (39.97±0.81). After 42 days, There was an important decrease at (P <0.05) in (M) group (36.82±1.46) as compared with Control group (40.45±0.65). There was increase significant (P <0.05) in HCT concentration in (T1, T2, T3) groups (P<0.05) that was (40.15±2.07), (41.40±1.54), (46.82±0.96), respectively, as compared with (M) group (36.82±1.46) and significant difference increase (P <0.05) compared to control group (40.45±0.65) in (T3). Comparing serum /HCT between periods 21 and 42 days after treatment showed non-significant difference among (M) (T1) and (T2) groups those were (M) group (35.15±1.18) after 21days and (36.82±1.46) after 42days and (T1) was (39.42±0.76) in 21days and (40.15±2.07) in 42 days. T2 showed (39.68±4.19) in 21days and (41.40±1.54) after 42 days. There was an important variation at (P <0.05) in (T3) group that was (41.58±0.97) after 21 days& (46.82±0.96) after 42 days, table (4).

3.5. Platelets (PLT) Concentration

The results revealed non-significant difference after 21 days in platelets value in (M) group (415.33±35.61) compared with control group (472.33±44.94), and there was a non-significant difference in platelets value in (T1, T2 &T3) groups (380.16±55.69), (396.00±23.10), and (461.50±40.24) which received *Lipidum sativum* extract seeds in doses (100,50 & 25) mg/kg, ,respectively as compared with group (M) (415.33±35.61), and compared control. After 42 days, there was there was a non-significant difference in group (M) (408.80±32.00) compared with control group (459.83±40.28).and increase significant difference in groups (T1,T2) and non-significant in (T3) that was(569.33±29.05), (594.66±31.07), (474.16±50.48) received *Lipidum sativum* Seeds extract in doses (100,50,25)mg/kg ,respectively, compared mercury group (408.80±32.00) and increase significant difference in(T2)compered control .Comparing Platelets PLT between periods of 21 and 42 days, the result show an important variation at (P <0.05) in groups T1 and T2 that was (T1) group

(380.16±55.69) in 21days &(569.33±29.05) after 42days and (T2)group that was(396.00±23.10) after 21days &(594.66±31.07) in 42 days. Also there was a non-significant difference in (M) (T3) group that was M (415.33±35.61) after 21 days & (408.80±32.00) after 42 days. (T3) group that was (461.50±40.24) after 21days& (474.16±50.48) after 42 days. table (5).

3.6. Mean corpuscular volume MCV (Fl) Concentration

The results showed non-significant difference after 21 days in Mean corpuscular volume MCV concentration in group (M) (71.76±5.64) compared to control group (63.01±1.09) and there was an important reduce at (T1),(T2) and (T3) groups those were (61.35±2.90) , (59.84±4.50) and (56.12±0.89) those received *Lipidum sativum* extract seeds in doses 100,50,25 mg/kg compared with group (M). After 42 days, there was there was a non-significant difference in group (M) (69.55±4.17) compared with control group (65.15±1.30) ; there was a non-significant difference in MCV(Fl) Concentration in (T1),(T2), (T3)group that was (61.57±4.73) and (60.38±1.81),(62.16±0.83) that received *Lipidum sativum* extract Seeds in doses 100,50,25 mg/kg, respectively, compared to (M) group (69.55±4.17) and compared with control group (65.15±1.30). Comparing MCV between periods 21 and 42 days after treatment, there was a non-significant difference in groups (M),(T1),(T2) & (T3) that was (M group)(71.76±5.64) after 21days and (69.55±4.17) after 42days and (T1)group that was(61.35±2.90) after 21days and (61.57±4.73) after 42 days. Also there was a non-significant difference in (T2) group that was (59.84±4.50) after 21 days & (60.38±1.81) after 42 days … (T3) group that was (A56.12±0.89b) after 21days& (A62.16±0.83a) after 42 days, table (6).

3.7. Mean corpuscular hemoglobin (MCH) Concentration

The results showed non-significant difference after 21 days in Mean corpuscular hemoglobin MCH concentration in group (M) (20.01±0.84) compared to control group (19.30±0.31) ;there was there was a non-significant difference at MCH (Pg) concentration in groups (T1),(T2) & (T3) that was (18.76±0.44) , (19.57±1.66),(18.23±0.30) that received *Lipidum sativum* extract Seeds in doses 100,50,25 mg/kg, respectively , compared with group (M) (20.01±0.84) and control . After 42 days there was a non-significant difference group (M) (20.50±1.30) as compared to control group (19.21±0.71); there was a non-significant difference in MCH concentration in groups (T2 & T3) that was (19.43±0.92),(18.15±0.26),respectively, and decrease significant difference in(T1) compered compared with (control group (19.21±0.71). Comparing MCH between periods 21 and 42 days after treatment , there was a non-significant difference in (M), (T1),(T2),(T3)group that was group (M)(20.01±0.84) after 21days &(20.50±1.30a) after 42days and (T1) group that was(18.76±0.44) after 21days and (17.91±0.99) after 42 days. Also there was a non-significant difference (T2) group that was (19.57±1.66) after 21 days and (19.43±0.92) after 42 days (T3) group that was (18.23±0.30) after 21days & (18.15±0.26) after 42 days, table (7).

3.8. Mean corpuscular hemoglobin (MCHC) concentration

The results showed non-significant difference after 21 days in Mean corpuscular hemoglobin concentration MCHC in group (M) (28.42±1.53) compared to control group (30.64±0.34) ; there was a non-significant difference MCHC concentration in groups (T1 &T3) groups, (30.81±1.14),(32.50±0.46) that received *Lipidum sativum* extract Seeds in doses 100,25 mg/kg , respectively, increase significant in (T2) compared with mercury group (30.64±0.34), and non-significant difference ($P<0.05$) compared Control group. After 42 days there was non-significant difference (M) group (30.08±3.22) in compared with control group (29.45±0.56). There was non-significant difference and in MCHC (g/dl) concentration in groups (T1, T2, T3) that was (29.44±1.43),(32.29±1.77),(29.21±0.32) respectively compared with (M) group (30.08±3.22) and control (29.45±0.56). Comparing MCHC between periods 21 and 42 days after treatment ,there was a non-significant difference in (M), (T1), (T2) and (T3) groups were (M) group (28.42±1.53) after 21days & (30.08±3.22a) after 42days and (T1) group was (30.81±1.14) after 21days and (29.44±1.43) after 42 days. Also (T2) group was (33.92±4.44) after 21days and (32.29±1.77) after 42 days and (T3) group that was (32.50±0.46) after 21 days and (29.21±0.32) after 42days, table (8).

4. Discussion

The current results reveal marked drop in total white blood cell count WBC in the exposure group received Mercury chloride of the same group within periods; such drop could be due to the stress factor that was associated with the release of the epinephrine from the adrenal medulla Also these results agree with the results of [13]. who referred to a decrease white blood cell count WBC and a decrease in its production. Also [14].recorded such changing in blood picture. On the other hand, the general effects of Mercury ordinary are associated with suppressing hemopoiesis in bone marrow activity. Such suggesting agrees with the result of Tikare et al., [17].

The current result of total RBCs reveal a similar condition of WBCs such observation was also mentioned by Adjroud and Mouffok [18] who recorded that the drooping of RBCs could be the decrease iron within erythrocytes or the content of Hemoglobin Hb. The decrease in RBCs leads to decrease in carrying capacity of oxygen by the blood. The current result agrees with the result of Sharma et al., [19] who revealed that the Mercury in blood is associated with red blood cells drop so the accumulated Mercury leads to certain hematological changes in blood On the other hand, high exposure to Mercury leads to marked reduce in the number of red blood cells and causes severe anemia [20,21]**.**

Moreover, the general effects of Mercury ordinary are associated with suppressing hemopoiesis in bone marrow activity; such suggesting agrees with the results of Sharma et al., [19]. The current result has recorded marked drop in total RBCc consequently, this droop affects the Hb concentration and leads to clinical anemia [20]. This reduction is probably due to the elaboration of Reactive Oxygen Species (ROS) under influence of the mercuric chloride [21,22]. Also such decrease was recorded by Al-Alwany [23]in animals which treated with Mercuric chloride. On the other hand, the opinion hemolysis was supported by Azab et al., [24] who mentioned destruction of RBCs in organs is one appearance of exposed to different levels of Mercuric chloride cause a decrease due to thinness and ruptures the cell membrane of RBCs and cell lysis, finally decrease Hb.

The present results show significant differences between groups which are definitely due to the toxic effect of the mercuric chloride on tissue, which results in destruction and decrease in the level of the RBCs count Also the drooping in the total erythrocyte count may be due to the cytotoxic effect of heavy metallic compounds on the bone marrow, which leads to alteration of the cell cycle and reduction in erythropoiesis [25]. The decrease of PCV is consistent with (25, 26]. The present result show that the PCV was improved in *Lipidum sativum* extract Seeds**.**

Table 1 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 and in Mercury chloride intubated Rats on white blood cell count WBC_C($x10^3/mm^3$) after 21days&42days as compared with Control group (n=6)

Group/WBC($x10^3/\mu L$)	**21 days Mean ± Standard error**	**42 days Mean ± Standard error**
Control (C)	A16.92±1.69a	A17.22±1.63a
M (Mercury chloride)	A8.63±0.56b	A9.38±0.38b
T1	A15.77±2.21a	A15.82±1.49a
T2	A16.82±2.23a	A16.10±1.62a
T3	A17.97±1.59a	A18.72±1.71a
LSD	4.6382	

Different small letter in the same column represents important variation at (P<0.05); Different capital letter in the same row represents important variation at (P<0.05)

Table 2 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 and in Mercury chloride intubated Rats on Red blood cell RBCC(x106/mm3) after 21days&42days as compared with Control group (n=6)

Group/RBC($x10^6/\mu L$)	**21 days Mean ± Standard error**	**42 days Mean ± Standard error**
Control (C)	A6.34±0.09a	A6.21±0.07b
M (Mercury chloride)	A4.99±0.26b	A5.34±0.27c
T1	A6.49±0.33a	A6.61±0.37b
T2	A6.62±0.40a	A6.87±0.25ab
T3	A7.40±0.08a	A7.54±0.21a
LSD	0.7358	

Different small letter in the same column represents important variation at (P<0.05); Different capital letter in the same row represents important variation at (P<0.05)

Table 3 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 & Mercury chloride intubated Rats on Hemoglobin Hb (g/dl) after 21days &42days as compared with Control group (n=6)

Group/Hb (g/dl	21 days Mean ± Standard error	42 days Mean ± Standard error
Control	A12.25±0.32b	A11.92±0.34b
M (mercuric chloride)	B 9.90±0.22c	A 10.92±0.78b
T1	A12.13±0.45b	A11.73±0.58b
T2	A12.76±0.70ab	A13.23±0.18a
T3	A13.50±0.25a	A13.67±0.26a
LSD	1.2359	

Means with different small letter in the same column significantly different (P<0.05); Means with different capital letter in the same row significantly different (P<0.05)

Table 4 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 & in Mercury chloride intubated Rats on Hematocrit HCT (%) after 21days&42days as compared with Control group (n=6)

Group/HCT (%)	21 days Mean ± Standard error	42 days Mean ± Standard error
Control	A39.97±0.81ab	A40.45±0.65b
M (mercuric chloride)	A35.15±1.18c	A36.82±1.46c
T1	A39.42±0.76bc	A40.15±2.07b
T2	A39.68±4.19bc	A41.40±1.54b
T3	B41.58±0.97a	A46.82±0.96a
LSD	4.6652	

Means with different small letter in the same column significantly different (P<0.05); Means with different capital letter in the same row significantly different (P<0.05)

Table 5 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 & in Mercury chloride intubated Rats on Platelets PLT (nx105) after 21days&42days as compared with control group (n=6)

Group/PLT	21 days Mean ± Standard error	42 days Mean ± Standard error
Control (C)	A 472.33±44.94a	A 459.83±40.28bc
M (Mercuric chloride)	A 415.33±35.61a	A 408.80±32.00c
T1	B 380.16±55.69a	A 569.33±29.05ab
T2	B 396.00±23.10a	A 594.66±31.07a
T3	A 461.50±40.24a	A 474.16±50.48bc
LSD	114.75	

Means with different small letter in the same column important different (P<0.05); Means with different capital letter in the same row important different (P<0.05).

The current results recorded high the MCV, MCH, MCHC showed non-significant values It suggested that mercury chloride affects (number) red blood cells and white blood cells and hemoglobin but does not affect the (volume) corpuscular , all these result disagree with result of [26] who mentioned that the increase in MCV could be due to an increase of immature RBC from bone marrow, the increase of MCV has been observed in expos for methylmercury MeHg and explained By having a larger amount of old or large red blood cells [27, 28]. The current results recorded decrease platelet showed non-significant values Suggested because of gastric infections caused by mercury chloride led to hemorrhage.

Table 6 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 & in Mercury chloride intubated Rats on MCV (Fl) after 21days&42days as compared with Control group (n=6)

MCV(Fl)	21 days Mean ± Standard error	42 days Mean ± Standard error
Control (C)	A63.01±1.09ab	A65.15±1.30a
M (Mercuric chloride)	A71.76±5.64a	A69.55±4.17a
T1	A61.35±2.90b	A61.57±4.73a
T2	A59.84±4.50b	A60.38±1.81a
T3	A56.12±0.89b	A62.16±0.83a
LSD	9.1466	

Means with different small letter in the same column important different (P<0.05); Means with different capital letter in the same row important different (P<0.05).

Table 7 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 & in Mercury chloride intubated Rats on MCH (Pg) after 21days&42days as compared with Control group (n=6)

MCH (Pg)	21 days Mean ± Standard error	42 days Mean ± Standard error
Control (C)	A19.30±0.31a	A19.21±0.71ab
M (Mercuric chloride)	A20.01±0.84a	A20.50±1.30a
T1	A18.76±0.44a	A17.91±0.99b
T2	A19.57±1.66a	A19.43±0.92ab
T3	A18.23±0.30a	A18.15±0.26ab
LSD	2.3877	

Means with different small letter in the same column important different (P<0.05); Means with different capital letter in the same row important different (P<0.05).

Table 8 Effect of Alcoholic Extract of *Lipidum sativum* in groups T1, T2, T3 & in Mercury chloride intubated Rats on MCHC (g/dl) after 21days&42days as compared with Control group (n=6)

Group/MCHC (g/dl)	21 days Mean ± Standard error	42 days Mean ± Standard error
Control (C)	A30.64±0.34ab	A29.45±0.56a
M (Mercuric chloride)	A28.42±1.53b	A30.08±3.22a
T1	A30.81±1.14ab	A29.44±1.43a
T2	A33.92±4.44a	A32.29±1.77a
T3	A32.50±0.46ab	A29.21±0.32a
LSD	5.1041	

Means with different small letter in the same column important different (P<0.05); Means with different capital letter in the same row important different (P<0.05).

The current results show an improvement of most hematological values (WBC, RBC, Hb, PCV and platelet in 42days) such improvement explained the importance of the *Lipidum sativum* extract Seeds of seeds that are used in treatment which might be due to the presence of minor essential mineral elements such as (Fe, Mn, Cu &Ca) [29] also the high iron and folic acid content in seeds which prevent iron deficiency anemia. In [30], the result is in agreement with the result of [31] that showed an increase in concentration of Hb in Rat. Intervals feeding with Garden Cress GC seeds (for 7, 10 & 14 days daily).The most effective ingredient in *Lipidum sativum* extract Seeds the isothiocyanates, which is formed with

glucosinolates [32]. The glucosinolatesis strength to protecting cells against oxidation and also contain Zn, Cu, Fe, Mg, Mn, and other elements [33].

5. Conclusion

The current results concluded the following:

- *Lepidium sativum* seeds have a good contain of polyphenolic compounds and total flavonoids
- Mercury chloride induced oxidative damage resulting effect in physiological parameters that decrease in (WBC, RBC, HB, HCT & showed non-Significant values (MCV, MCH, MCHC, platelet
- *Lepidium sativum* extract seeds have protective effects against lipid peroxidation, and improvement the values of WBC, RBC, HB,PCV .

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that ther is no conflict of interest.

Statement of ethical approval

Ethical approval for the use of Animal was approved by the Ethical committee of the Unit.

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