

Biological Functions of Rabbits as Affected by Pesticides and its Amelioration under Sinai Conditions

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Abstract: Forty male New Zealand White rabbits 35 days and 950 gm average body weight were used to study the effect of dimethoate and its amelioration using treatments (Vitamins C and E). The rabbits divided into 8 groups (5 each). The first group was provided by olive oil only (1 ml oil/ Rabbit) using a stomach tube and was used as a control. The second group was subjected to dimethoate (5 mg/dissolved in 1 ml olive oil/ Rabbit) via a stomach tube per day to study the effects of dimethoate on biological functions of rabbits. Groups 3, 4 and 5 were treated with dimethoate plus vitamin C (1gm /2.5 L), vitamin E (1 gm/L) and vitamins C+E with the same dosage, respectively the vitamins were added to drinking water. The groups 6, 7, 8 were treated with vitamin C, vitamin E and vitamin C + vitamin E with the same previous dosages, respectively and used as a negative control. The results showed that exposing rabbits to dimethoate significantly decreased ($P > 0.05$) total protein, albumin, RBCs, Hemoglobin, PVC, MVC, MCH and MCHC by 18.1, 24.6, 37.7, 62.4, 32.2, 17.6, 25.1 and 20.1%, respectively. While white blood cells, blood billiurbun, creatinene, SGPT, ALP, LDH the increased by 59.3, 100.4, 71.2, 45.4, 63.4 and 47.6 %, respectively. Using above amelioration had improved and partially recovered the deterioration effects of the pesticide on rabbit biological function. The best treatment was the combination between Vitamin C and E.

Keywords: Rabbits, pesticides, Dimethoate, Vitamin E, Vitamin C and Blood Measures.

INTRODUCTION

Pesticides are substances or a mixture of substances, of chemical or biological origin, used by human society to mitigate or repel pests such as bacteria, nematodes, insects, mites, mollusks, birds, rodents, and other organisms that affect food production or human health. They usually act by disrupting some component of the pest's life processes to kill or inactivate it. In a legal context, pesticides also include substances such as insect attractants, herbicides, plant defoliant, desiccants, and plant growth regulators. (Ekstrom, 1994).

Dimethoate (DIM) is an Organophosphorodithioate (OPT) pesticide used worldwide as a systemic insecticide and acaricide used for the control of a wide range of insects, including houseflies and mites, on a variety of fruits, vegetables, field and forestry crops. It is characterized by low-to-moderate acute mammalian toxicity; similarly to the other OPT pesticides, its mode of action is mediated by the inhibition of Acetylcholinesterase (Ache), exerted by its toxic metabolite Dimethoate-Oxon Or Omethoate (OME), which is also used as a direct acting pesticide (Franca *et al.*, 2007)

Antioxidants such as vitamin E and C prevents lipid peroxidation chain reactions in the cell membrane. This by two ways the first one by interaction with unsaturated fatty acids, and the second by protecting the polypeptide chains of proteins. It has been observed that vit. E and vit. C exert protective effects against cancers caused by chemical agents and radiation. As well as vit. E blocks the formation of carcinogenic nitrous amines. Vitamin E and vit. C exert their protective effects in different regions of the cell. vitamin E is effective in all cell membranes, in the nucleus, endoplasmic reticulum and mitochondria, while vit. C is effective in the

cytoplasm and lysosomes. glutathione is effective in the cytoplasm and mitochondria and shows its effects by scavenging the free radicals, thereby maintaining cell homeostasis Cemil Sert *et al.* (1999). Therefore, the present study was carried out to through some lights on the effect of dimethoate pesticides and its amelioration in male New Zealand White rabbits using some antioxidants nutritional means such as vitamin E and C. Blood, liver and kidney function as affected by dimethoate and its amelioration were also studied.

MATERIALS AND METHODS

The present study was carried out at Rabbit Farm, Faculty of Environmental Agricultural Sciences, Suez Canal University, EL-Arish North Sinai, Egypt. The study aimed to study the effect of Dimethoate in male New Zealand White rabbits as well as to alleviate the effects of Dimethoate using some antioxidants nutritional means such as vitamin E and C.

Forty weaned males of New Zealand white rabbits (NZW) with 35 days and 950 gm weight were used. The rabbits were divided randomly to eight equal and similar groups (5 animals each). The first group was provided by olive oil (1 ml oil/ Rabbit) using a stomach tube per day and was used as control. The 2nd group was subjected to dimethoate (5 mg/dissolved in 1 ml olive oil/ Rabbit) via a stomach tube per day to study the effects of Dimethoate on biological function of rabbits. The groups 3, 4 and 5 were treated with Dimethoate (5 mg/dissolved in 1 ml olive oil/ Rabbit) plus vitamin C (0.4gm /L), vitamin E (1 gm/L) and vitamin C+E with same dosage, respectively, the vitamins were added to drinking water. Group 6 was received vitamin C 1g/L, while group 7 received vitamin E 1g/L. Group 8 were subjected to vitamin E plus vitamin C with the same dosage. Groups 6, 7 and 8 were used as a negative

control to study the effects of Vitamins in ameliorating Dimethoate bad effects.

Animal were fed on pelleted diets ad libitum the experimental feed stuffs ingredients were Wheat bran (21%), Barley grain (32%), Clover hay (28%), Corn gluten (60% CP) (1.35), Cotton seed meal (3%), Soy bean meal (10%), Molasses (3%), Limestone (1%),

Sodium chloride (0.25%), DL- Methionine (0.10%) and Premix (0.3%).

All animals had free access underground water which was available automatically all times by stainless steel nipples in each cage. The analysis of this water used in drinking the experimental animals was carried out using Atomic absorption and spectrophotometer according to Page (1982) and are shown in Table 1.

Table (1): Composition and chemical analysis of the experimental drinking water

Elements	TDS (ppm)	Zn (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Ca (ppm)	K (ppm)	P (ppm)	Na (ppm)
Level	3500	1.54	0.98	0.05	0.02	54.74	18.35	9.6	705.2

The rabbits were healthy and clinically free of external and internal parasites, the animals were raised in flat deck batteries with Universal specification and accommodated with feeders and drinkers for providing animal with pelleted and water according to different treatments and were efficient for hygienic control. The rabbits were housed in galvanized wire cages in a well ventilated (with open windows and ventilating fans) in summer and the rabbits were housed 2 in each collective cages (40X40X25 cm).

At the end of the experiments, rabbits were slaughtered and blood samples were collected into centrifuge tubes allowed to clot at room temperature. Serum was then separated by centrifugation at 3000 rpm for 15 min, and subsequently decanted into glass vials and stored at -20 ° until analyzed. Total Protein (T.P), Albumin (A), Globulin (G), A/G Ratio, Total Bilirubin (T.BIL) and creatinine (Cret). as well as Glutamate Pyruvate Transaminase (GPT), Alkaline Phosphates (ALP), Acetyl Cholinesterase (AChE), Lactate dehydrogenate (LDH), hematological parameters total count of Red Blood Cells (R.B.CS), White Blood Cells (W.B.CS), Hemoglobin (HB), Packed Cell Volume (Hematocrit) (PCV), Mean Cell Volume (MCV), Mean Cell Hemoglobin (MCH), and Mean Cell Hemoglobin Concentrations (MCHC) the all above mentioned parameters were determined calorimetrically using assay kits supplied by bio merieux (France) and randox (England).

All data obtained were analyzed by (RCBD) according to Sendecor and Cochran (1982) using MSTAT-C computer program. Significant difference ($p < 0.05$) were determined by Duncan's Multiple Range (Duncan, 1955).

RESULTS AND DISCUSSION

Effects of dimethoate and its amelioration on:

Plasma proteins:

Data in table 2. indicated that supplemented rabbits with dimethoate pesticides alone had significantly decreased total protein, albumin and A/G by 18.1, 24.4 and 35 % respectively, in comparing with control group however blood globulin increased insignificantly by 8.2%. Contrary, treated male rabbits by antioxidant treatment with dimethoate alleviated the toxic effect of pesticide on blood total protein albumin, A/G and globulin. The best results were obtained with

dimethoate plus vitamin C and E (group, 5) by 21.1, 32.9, 50.3 and 12.4% respectively, compared with the group which treated with dimethoate pesticides alone.

Similar results were obtained by Maged (1995) who found that serum albumin and total protein decreased in rats treated with malathion. A slight drop in total protein and disturbances in serum A/G ratio was obtained by Brzeva (1966), in workers engaged in spraying various pesticides (Mostly OP compounds). Similar effect was also reported by Gulayamov (1967) after daily feeding methyl -mercaptophos to rabbits and by orally administration of cypermethrin and dimethoate to sheep (Yousef *et al.*, 1998) Contrary, Terziev *et al.* (1970) stated that oral administration of 1% solution of Dimecron to rats did not change the total serum protein. However El- Nabarawy (2001) found acute exposure to malathion and dimethoate resulted in an increase in total protein and albumin in rats.

The decline in plasma total proteins may be due to decline in plasma globulin and albumin. Since albumin synthesis took place only in liver, the exposure to hepatotoxic compound may decreased albumin fraction in blood plasma (Slater, 1978). Also, the depression of alpha-globulin may be a sign of insufficient synthesis of these fractions caused by disturbed liver function (Gray, 1976). Reduction in serum protein was reported by El- Asser (1982) in rabbits treated with dimethoate, who showed that this reduction was probably due to the decrease in RNA and protein synthesis as a result to the adverse effect of pesticide on the lysosomal membrane which released nucleases and proteases affecting RNA and protein metabolism

Kidney function:

Data in Table 2. illustrated that total bilirubin (T.BIL) and creatinine had increased ($P < 0.05$) by 57.7 and 41.8 when treated male rabbits with dimethoate pesticide alone. However using antioxidant treatment with dimethoate alleviated the bad effect of pesticide on liver function and the best results obtained with the combination of the dimethoate with Vit. C + E which improved the effect of pesticide on bilirubin (T.BIL) and creatinine by 46.34 and 40.65 compared with the group which treated with dimethoate pesticides alone.

Our results are in accordance with those of El-Nabarawy (2001) who found a significant increase in bilirubin and creatinine levels in mice given the organophosphorus pesticide surecide. Maged (1995) also reported an increase in bilirubin and creatinine

levels as a results of espousing rats to organophosphorus insecticides. The obtained results are somewhat variant with the findings of Enan (1983) who found that, bilirum levels were not affected at 24 hrs. after any malathion, DDVP and dimethoate administration in male rats, while malathion and dimethoate significantly decreased the female bilirubin content.

The increase in plasma bilirubin levels may be due to some causes of overproduction of bilirubin such as intravascular hemolysis but plasma is not a sensitive indicator of hepatic dysfunction and may not accurately refelect the degree of liver damage. An increase in plasma albumin concentration may induce shift of bilirubin from tissue sites into the circulation Maged (1995).

Table (2): Effect of Dimethoate and different antioxidants on plasma protein and liver function in growing male New Zealand white rabbits

Treatments	TP g/dl	A g/dl	G g/dl	A/G g/dl	T.BIL mg/dl	Cret mg/dl
Control	6.78 ± 0.29 ^a	5.44 ± 0.18 ^a	1.34 ± 0.33 ^a	4.05 ± 0.97 ^b	0.26 ± 0.02 ^{dc}	0.53 ± 0.01 ^{bcd}
T	5.55 ± 0.07 ^d	4.10 ± 0.09 ^d	1.45 ± 0.05 ^a	2.82 ± 0.21 ^c	0.41 ± 0.02 ^a	0.91 ± 0.03 ^a
T+V.C	5.93 ± 0.12 ^c	4.69 ± 0.09 ^c	1.22 ± 0.19 ^c	3.70 ± 0.51 ^b	0.22 ± 0.01 ^{bc}	0.54 ± 0.04 ^b
T+VE	5.80 ± 0.12 ^c	4.76 ± 0.09 ^b	1.04 ± 0.16 ^d	4.57 ± 0.42 ^a	0.21 ± 0.01 ^{cd}	0.53 ± 0.02 ^{bcd}
T+VC+VE	6.72 ± 0.17 ^b	5.45 ± 0.05 ^a	1.27 ± 0.15 ^b	4.24 ± 0.1 ^a	0.22 ± 0.01 ^{bc}	0.53 ± 0.01 ^{bc}
V.C	6.66 ± 0.07 ^b	5.38 ± 0.07 ^a	1.28 ± 0.09 ^b	4.20 ± 0.14 ^b	0.21 ± 0.01 ^c	0.54 ± 0.01 ^b
V.E	6.71 ± 0.09 ^b	5.44 ± 0.08 ^a	1.27 ± 0.13 ^b	4.28 ± 0.76 ^b	0.21 ± 0.01 ^{de}	0.52 ± 0.01 ^{cd}
V.C+V.E	6.79 ± 0.04 ^b	5.43 ± 0.07 ^a	1.36 ± 0.07 ^a	3.99 ± 0.2 ^{ab}	0.21 ± 0.01 ^{de}	0.52 ± 0.01 ^d

a,b,c,d, means the different superscripts between treatments differ significant (P<0.05)

T = Toxic (Dimethoate), V.C = Vitamin C, V.E = Vitamin E, T+VC=Toxic+Vitamin C, T+VE=Toxic+Vitamin E, T+VC+VE =Toxic+Vitamin C +E, V.C + V.E = VITAMIN E+ Vitamin C and Control = Check Untreated

Liver Function

Data in Table 3 showed that rabbits exposure to dimethoate had increased (P< 0.05) Glutamate Pyruvate Transaminase (GPT), Alkaline Phosphate (ALP) and Lactate Dehydrogenate Enzyme (LDH) by 45.4, 63.4 and 47.7 comparing to the control group. However the antioxidant treatment improved the effect of pesticide in which the best results obtained with dimethoate plus Vit E for Glutamate Pyruvate Transaminase (GPT), Alkaline Phosphate (ALP) but with dimethoate plus Vit C for Lactate Dehydrogenate Enzyme (LDH) compared with the group which treated with compared with the group which treated with dimethoate pesticides alone.

The similar results obtained by Eto (1974) who found that Plasma AST, ALT and ALP levels were increased in quail dosed with OP insecticide carbophenothion also in rats by Maged (1995). On the other hand Yousef *et al.* (1998) in Barki Sheep found that the activity of AST, ALT and ALP were significantly decreased when treated animals with dimethoats pesticides daily for 30 days. However El-Nabarawy (2001) found that no significant difference in AST, ALT and ALP male albino rats treated by malathional and dimethoate

The elevation of transaminase activity in plasma may be due to tissue damage particularly in liver, kidney and heart (Rouiller, 1964) and increased permeability of cell membrane increased synthesis or decreased catabolism of transaminases (Malik *et al.*, 1980). The release of specific tissue enzymes into the blood stream is dependent on both the degree and type of damage exerted by the pesticide administred (Westlake *et al.*, 1981). Malathion has inhibitory effect on hepatic GPT and GOT activity this may results from damage to the cellular membrane, leading to a leakage of the enzymes, Bulusu and Chakravarty (1984).

Acetye Cholinestrase (ACHE)

Data in Table 3 affirmed that all treatments significantly decreased Acetye Cholinestrase. Rabbits

supplemented dimethoate alone decreased (P< 0.05) Acetye Cholinestrase by 65.8 % than control group. However the combination between the dimethoate plus Vit C and E alleviate the bad effect of pesticide by 11.8% than group which treated with dimethoate pesticides alone. Similar results obtained by Ting *et al.* (2007) who found that Acetye Cholinestrase decreased (P<0.05) when treated rats with 10 and 20 mg/kg dimethoate. Also Yousef, *et al.* (1999) found Acetye Cholinestrase decreased (P< 0.05) in sheep when used dimethoate and cypermethrin. The same results obtained by (Ting *et al.*, 2007; Sayim, 2007; HongXia *et al.*, 2006; Vos, *et al.*, 2002).

Blood Measures

Data in Table 4. indicated that supplemented rabbits with dimethoate pesticides alone had decreased (P<0.05) red blood Cells (R.B.Cs), hemoglobin (HB) and packed cell volume (Hematocrit) (PCV) by 37.65,22 and 32.5 respectively, comparing with control group however white blood cells (W.B.Cs), mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC) had increased (P<0.05) by 59.3, 17.6, 25.3 and 20.11, respectively, on the other hand treated male rabbits by antioxidant treatment with dimethoate alleviated the toxic effect of pesticide on all blood parameters. The best results were obtained with dimethoate plus vitamin C and E.

The noted reduction in the number of erthrocyted in the treated animals may take place as a result of the occurrence of hemorrhages and clotting (Ziolo *et al.*, 1973). Extensive hemorrhaging to the pulmonary parenchyma and also in the mucous membrane of the stomch occur in Ekatin intoxication. Gromysz – Kalkowska *et al.* (1981) have drown attention to the hemolytic action of organophosphorous pesticides.

Our results agree with Schalm *et al.* (1975), who mentioned that significant decreased in hemoglobin concentration and RBCs count may be due to

suppressive effect of the drug on the bone marrow and consequently leads to decrease in myeloid erthroid cells. Also Paget (1970) showed that the red cells were low in hemoglobin concentration and stained poorly, i.e. hypochromic in cases of long term poisoning with hepatotoxic agents.

Ting *et al.* (2007) observed that exposure rats to dimethoate decreased ($P < 0.05$) Red Blood Cells (R.B.Cs), Hemoglobin (HB) and Packed cell volume

(Hematocrit) (PCV) however blood White blood cells (W.B.Cs), Mean cell volume (MCV) increased. Also in sheep Yousef, *et al.* (1999) used dimethoate and cypermethrin he found that Red Blood Cells (R.B.Cs), Hemoglobin (HB) and Packed cell volume (Hematocrit) (PCV) decreased ($P < 0.05$) the same results were obtained by (Ting *et al.*, 2007; Sayim, 2007; HongXia *et al.*, 2006; Vos, *et al.*, 2002; El- Nabarawy, 2001).

Table (3): Effect of Dimethoate and different antioxidants on Plasma Enzymes and Acetylene Choline in growing male New Zealand White rabbits

Treatments	GPT u/l	ALP U/l	LDH U/l	AchE U/L
Control	62.12 ± 1.21 ^c	88.20 ± 1.96 ^{dc}	536.5 ± 4.39 ^c	111.7 ± 7.02 ^a
T	90.30 ± 20.52 ^a	144.08 ± 6.43 ^a	792.0 ± 3.91 ^a	38.27 ± 7.02 ^d
T+V.C	61.60 ± 2.64 ^{bc}	94.02 ± 2.08 ^c	616.8 ± 4.93 ^b	64.16 ± 7.02 ^c
T+VE	61.90 ± 0.71 ^{bc}	96.29 ± 1.17 ^b	605.24 ± 2.9 ^c	87.96 ± 7.02 ^b
T+VC+VE	60.29 ± 1.03 ^d	88.20 ± 1.86 ^{dc}	611.16 ± 2.3 ^{bc}	98.55 ± 7.02 ^{ab}
V.C	61.46 ± 1.07 ^{bc}	87.58 ± 2.02 ^{EF}	552.76 ± 3.54 ^d	111.63 ± 7.02 ^a
V.E	61.91 ± 1.44 ^{bc}	88.79 ± 1.41 ^d	559.11 ± 3.57 ^d	110.62 ± 7.02 ^a
V.C+V.E	60.84 ± 1.87 ^{cd}	87.19 ± 2.7 ^{ef}	546.6 ± 4.56 ^d	111.70 ± 7.02 ^a

a,b,c,d, means the different superscripts between treatments differ significant ($P < 0.05$)

T = Toxic (Dimethoate), V.C = Vitamin C, V.E = Vitamin E, T+ VC = Toxic + Vitamin C, T + VE = Toxic + Vitamin E, T+VC + VE = Toxic + Vitamin C +E, V.C + V.E = VITAMIN E+ Vitamin C and Control = Check Untreated.

Table (4): Effects of Dimethoate and different antioxidants and their mixture on immunity in growing male New Zealand White rabbits.

Treatments	R.B.Cs X10 ⁶ /ml	W.B.Cs X10 ³ /ml	HB g/dl	PCV %	MCV fl	MCH Pg	MCHC g/dl
Control	6.80 ± 0.07 ^a	11.26 ± 0.66 ^{cd}	12.91 ± 0.44 ^a	44.94 ± 1.27 ^a	67.69 ± 0.86 ^b	30.73 ± 0.12 ^c	30.73 ± 0.12 ^c
T	4.24 ± 0.09 ^c	17.94 ± 36.54 ^a	10.07 ± 0.35 ^c	30.48 ± 1.48 ^c	79.61 ± 0.94 ^a	36.91 ± 0.33 ^a	36.91 ± 0.33 ^a
T+V.C	5.58 ± 0.19 ^d	12.64 ± 0.46 ^b	10.19 ± 0.21 ^c	37.0 ± 1.08 ^{bcd}	67.11 ± 0.62 ^c	31.72 ± 0.81 ^b	31.72 ± 0.81 ^b
T+VE	6.02 ± 0.2 ^c	12.38 ± 0.85 ^b	11.71 ± 0.37 ^b	40.48 ± 1.02 ^b	67.09 ± 1.06 ^c	30.24 ± 0.31 ^d	30.24 ± 0.31 ^d
T+VC+VE	6.54 ± 0.09 ^b	12.30 ± 0.18 ^b	12.10 ± 0.29 ^a	36.34 ± 1.32 ^{cd}	67.71 ± 0.94 ^b	30.22 ± 0.53 ^d	30.22 ± 0.53 ^d
V.C	6.81 ± 0.06 ^a	11.40 ± 0.32 ^{cd}	12.42 ± 0.13 ^a	44.62 ± 0.55 ^a	67.66 ± 0.37 ^b	30.60 ± 0.36 ^c	30.60 ± 0.36 ^c
V.E	6.83 ± 0.06 ^a	11.51 ± 0.21 ^c	12.58 ± 0.21 ^a	44.68 ± 1.38 ^a	67.64 ± 0.97 ^b	30.80 ± 0.34 ^c	30.80 ± 0.34 ^c
V.C+V.E	6.85 ± 0.11 ^a	11.10 ± 0.84 ^d	12.92 ± 0.35 ^a	44.78 ± 0.83 ^a	67.82 ± 1.52 ^b	30.77 ± 0.33 ^c	30.77 ± 0.33 ^c

a,b,c,d, means the different superscripts between treatments differ significant ($P < 0.05$)

T = Toxic (Dimethoate), V.C = Vitamin C, V.E = Vitamin E, T+VC=Toxic+Vitamin C, T+VE=Toxic+Vitamin E, T+VC+VE =Toxic+Vitamin C +E, V.C +V.E=VITAMIN E+ Vitamin C and Control = Check Untreated

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الوظائف البيولوجية للأرانب نتيجة تأثير المبيدات و مخففاتهما

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 ** قسم الإنتاج الحيواني والداجنى- كلية العلوم البيئية الزراعية بالعريش- جامعة قناة السويس- مصر
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أجريت هذه الدراسة بمزرعة الأرانب بقسم الإنتاج الحيواني، كلية العلوم الزراعية البيئية بالعريش، جامعة قناة السويس خلال الفترة من مارس- مايو ٢٠٠٧ م وقد تمت هذه الدراسة على ذكور الأرانب النيوزلندي البيضاء بهدف دراسة تأثير مبيد الدايميثويت (Dimethoate) و مخففاتهما على الأرانب النامية

تم استخدام ٤٠ أرنب من ذكور الأرانب النيوزلندي البيضاء النامية عند عمر ٣٥ يوم بوزن ٩٥٠ إلى ٩٩٥ جرام و قسمت الأرانب إلى ٨ مجموعات بواقع خمسة أرنب لكل معاملة. المجموعة الأولى تم تعريضها للظروف الطبيعية واستخدمت كمجموعة ضابطة. المجموعة الثانية استخدم فيها خمسة أرنب تم معاملةها بمبيد الدايميثويت (Dimethoate) بجرعة ٠,٠١ من الجرعة المميتة (LD₅₀) المجموعة الثالثة تم معاملةها بالمبيد بجانب فيتامين C بجرعة قدرها ٠,٤٠ جرام / لتر ماء شرب. المجموعة الرابعة تم معاملةها بالمبيد بجانب فيتامين E بجرعة ١ جرام/ لتر ماء شرب. المجموعة الخامسة تم معاملةها بالمبيد بجانب فيتامين C + فيتامين E بنفس الجرعات السابق ذكرها. المجموعات ٦ ، ٧ ، ٨ تم معاملةها بفيتامين C، فيتامين E ، فيتامين C + فيتامين E بنفس الجرعات السابق ذكرها على التوالي واستخدمت كمجموعات ضابطة سلبية.

أدى معاملة ذكور الأرانب النيوزلندي بمبيد الدايميثويت إلى انخفاض نسبة كل من البروتين الكلى والبيومين الألبومين/ الجلوبيولين و انزيم ACHE بمعدل ١٨,١٤ و ٢٤,٦٣ و ٣٥,٠٤ و ٣٤,٢٦% عن المجموعة الضابطة على التوالي. بينما زادت نسبة الكرياتنين ونسبة الصفراء وانزيمات SGPT و ALP و LDH في الدم معنوياً عن المجموعة الضابطة بمعدل ٧١,١٦ و ١٠٠,٤ و ٤٥,٣٦ و ٦٣,٣٥ و ٤٧,٦٢% على التوالي. بينما أدى استخدام مخلوط مبيد الدايميثويت مع فيتامين C و E إلى تحسين معظم صفات مكونات الدم.