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RESEARCH ARTICLE

Toxicological Impact of Inhaling Burned Plastic Bag Exhausts on Japanese Quail Birds and the Protective Role of Vitamins E and A.

H. A. Abd Elmonem; E. A. Ali and M. M. Wakwak

Biological Applications Dept., Nuclear Research Centre (NRC), Egypt.

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***Corresponding Author**

Hanan A. Abd Elmonem

Abstract

Plastic combustion under open-fire conditions can generate smoke and airborne particulate where they can be inhaled by humans and animals and deposited in soil and surface water in addition to plants. This study was conducted to evaluate the role of vitamin E and A mixture to alleviate the toxic effects of burned plastic bag exhausts on some hematological and biochemical parameters of Japanese quail birds. A total number of 210 seven day-old Japanese quail birds nearly similar body weights (12.7 gm) were randomly divided into 3 groups, 70 birds in each. Birds of 1^{st} group were fed commercial diet and served as control (G1). Birds of the two other groups (G2, G3) were exposed for 5 days/week to exhausts of burned plastic bags (150 gm black bags/48 m^3) for five weeks. Birds of the 2^{nd} group fed commercial diet without any additives while, the3^{rd} group fed commercial diet plus mixture of vit.E (120 mg/kg diet) and vit.A (1500 IU/kg diet).

The results showed that birds exposed to burned plastic bags exhausts significantly decreased body weight, haemoglobin concentrations (Hb), red blood cell counts (RBCs),white blood cell counts (WBCs),spleen weight, bursa weight, total haemagglutinine antibody (HA) titre against sheep red blood cells (SRBCs), activity of reduced glutathione (GSH), calcium (Ca) and potassium (K). There were significant increases in the levels of triiodothyronine (T3) malondialdehyde (MAD), aspartate transaminase (AST), alkalin phosphatase (ALP),urea, uric acid creatinine, magnesium (Mg), phosphorus (P), sodium (Na) and aldosterone inG2 compared to the control group. Administration of antioxidant vitamins combined with burned plastic bag exhausts improved most of these parameters. In conclusion these results indicate that burned plastic bag exhausts mainly affect most biochemical and hematological parameters. Therefore, plastic should not be burned but it should be recycled when possible or sent to the landfill if no recycling options are available. In addition vit.E and vit. A reduce toxic effect of burning plastic in opening area.

Introduction

Environmental pollution is one of the most serious problems, increasing with every passing year and causing grave and irreparable damage to the earth. Environmental pollution whether solid, liquid or gaseous is causing adverse effects on the behaviour and life of mankind and considerably damaging the animal, birds and plant life.Introduced in the 1970s, plastic bags have over taken the shopping market and today almost every one carries shopping and food in plastic trays, containers, and bags. All of these plastic packaging materials, after occasional reuse, get discarded in trash, garbage, or litter. Even if recycled, most of the recovered plastic winds up in trash as garbage bags or other disposable plastic materials (**Williams, 2004**). Burning of plastic is one of environmental pollution. Plastic combustion under open-fire conditions can generate smoke and airborne particulate where they can be inhaled by humans and animals and deposited in soil and surface water and on plants. Residue from burning contaminates the soil and groundwater and can enter the human food chain through crops and livestock. If humans are near burn piles that contain plastic bags, they can easily ingest the toxic fumes directly into their systems(**Simoneitet al., 2005**).The most common toxic gases in fire smoke are carbon monoxide and carbon dioxide. Other gases may also be produced in toxicologically significant quantities, depending on the chemical structure of the burning material and the fire conditions (**Kaplan et al., 1984**).

Valavanidis et al.(2008) showed that all plastics burned easily generating charred residue solid ash and black airborne particulate smoke. Persistent carbon- and oxygen-centered radicals, known for their toxic effects in inhalable airborne particles, were detected in both particulate smoke emissions and residue solid ash. Toxic heavy metals (such as Pb, Zn, Cr, Ni, and Cd) and polyaromatic hydrocarbons (PAHs) were detected in the residue solid ash.

Plastic bags are an oil based product, which contains the chemical elements of hydrogen and carbon. When plastic bags burn, the composition of the bag mixed with the heat produces a highly toxic chemicals such as styrene, dioxins, furan, 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (TCDD) (**Larsen et al., 1994, Wang et al., 1999**)

Exposure to acute and chronic toxic levels of TCDD in various animal species and man, causes a wide-variety of adverse effects in tissue and species specific manner, including hepato-toxicity, carcinogenicity, teratogenicity, interference with lipid metabolism, reduction of bone strength, neurobehavioral effects, endocrine disruption, wasting syndrome, thymicatrophy, developmental and reproductive toxicity and immunosuppression (**Esser et al., 2005 and Finnila et al., 2010**).

Antioxidant vitamins have a various biological activities. Vitamins E and A are well known antioxidants. Vitamin E has been reported as an excellent biological chain-breaking antioxidant that protects cells and tissue from lipoperoxidative damage induced by free radicals(**Jena et al., 2013**). Vitamin A is an essential micronutrient for immunity, cellular differentiation, growth, reproduction, maintenance of epithelial surfaces, and vision (**Tanumihardjo, 2011**).

There are scantly literatures concerning the effect of burned plastic bags exhausts. The present work was undertaken to study the suggestive protective role of synthetic (vit E and A) against the possible toxic effect of burned plastic bag exhausts on some hematological and biochemical parameters of male Japanese quail birds as an experimental models for human and domestic animals.

Material and methods

Experimental animals and food supplementations:-

A total number of 210 seven day-old Japanese quail chicks, average initial body weights (12.7 gm), were obtained from poultry experimental house of the Biological Application Department, Nuclear Research Center, Atomic Energy Authority at Inshas, Egypt. The quail chicks were divided into 3 equal groups (70 birds in each).The first group (G1), served as control, and was fed commercial diet. The second group (G2) exposed for 5 days/week to exhausts of burned plastic bags (150 gm black bags/48 m^3) and fed on commercial diet without any additives. The third group (G3) exposed for 5 days/week to exhausts of burned plastic bags (150 gm black bags/48 m^3)and fed on commercial diet plus mixture of vit.E (120mg/kg diet) and vit.A (1500 IU/kg diet). The mean body weights/battery cage /week was also calculated

Commercial diet (Table 1) were formulated according to NRC (1994) recommended growing and laying quail requirements. The quail of each group began to exposure to the smoke of burned plastic bags and supplementation of fed additives from 7^{th} day of age (the 1^{st} day of experiment) till the end of experimental period (5 weeks).

Blood sampling and analysis

At the end of the experimental period (5 weeks), six blood samples (pooled samples) were collected from each group, each sample divided in two tube one of them for separating serum where serum was collected after blood sample centrifugation at 3000 rpm for 15 min and serum obtained was stored at -20°c until biochemical analysis. The other tube contains heparin to count RBCs and WBCs according to **Natt and Heric (1952)** and determine Hb concentration according to **Dacie and Luice (1991).** The humeral immunity of birds represented as Haemagglutination Inhibition test (HA) determined as follow:

Fresh sheep red blood cells (SRBCs) were collected from sheep, washed three times with saline solution and centrifuged at 3000 rpm, then diluted with saline solution to form a concentration of 5% SRBCs that was used immediately for injection. Each quail was intravenously injected with 0.2 ml of the suspension after four weeks. Blood samples were collected after one week to separate serum which stored under -20°c until antibodies to SRBCs were determined by the method of **Wegman and Smithies (1966)**.

Activities of GSH and catalase (CAT) and levels of MAD in serum were estimated by the methods of **Ohkawaet al. (1974), Chance and Maehly (1955) and Beutler et al. (1963),** respectively, by using commercial kit purchased from Biodiagnostic reagent kits Co., Dokki, Giza, Egypt.

Alanine transaminase (ALT), aspartate transaminase (AST), alkalin phosphatase (ALP), total protein (TP), albumin (Alb.), urea, uric acid, creatinene, calcium (Ca), magnesium (Mg), inorganic phosphorous (P), sodium (Na) and potassium (K) were estimated calorimetrically using spectrophotometer (Milton Roy Spectronic 1201) using commercial kits purchased from Biodiagnostic reagent kits, Dokki, Giza, Egypt.

The estimation of serum triiodothyronine (T3) and aldosterone levels was measured by radioimmunoassay using commercial kits (Institute of Isotopes Co., LTD Budapest**)**

Statistical analysis

The obtained data were statistically analyzed using one way analysis of variance ANOVA. Differences among means were tested using Duncan's multiple range test (**Duncan, 1955)**.

Results

Table (2) showed the effect of inhaling burned plastic bag exhausts on body weight of males Japanese quail birds. Data presented in the Table showed that there was significant decrease between G1 (control) and G2 (exposed to burning exhaust) after 3^{rd}, 4^{th}, 5^{th} week. This significant difference returned to normalcy in group exposed to burned plastic bag exhausts plus antioxidant supplementation after 5^{th} week only.

Figure 1 illustrates the value of T3 in three tested groups. There was significant increase in T3 in G2 (exposed to burn plastic bag exhausts) compared to both control and antioxidant(vit E+A) groups.

Table (1).Ingredients and calculated composition of the diets fed to Japanese quail birds.

Ingredients (%)	Grower diet %
Yellow corn	52.90
Soybean meal (44%)	35.00
Glutin	6.00
Vegetable oil	3.00
Dicalcium phosphate	2.00
Limestone	1.90
DL-methionine	0.20
Sod. Chloride	0.40
Yeast	0.15
Amino vet.	0.05
Zinc pacitracin	0.015
Choline chloride	0.20
Lysine	0.20
Calcium carbonate	1.10
Vitamin and min. premix*	0.30
Crude protein	23.8
Metabolizable energy kcal ME/kg	3045

*Vitamin and mineral premix (contained per Kg):- vit A, 1200 IU; vit D, 1100 IU; vit E, 12mg; vit B12, 0.02 mg; vit B1, 1 mg; choline chloride, 0.16 mg; copper, 3 mg; iron, 30 mg; manganese, 40 mg; zinc, 45 mg; and selenium, 3 mg.

The results of the present study revealed significant decreases in Hb concentration, RBC and WBC in Japanese quail exposed to burn plastic bag exhausts. Administration of antioxidant (vit E+A) combined with burned plastic bag exhausts increase significantly Hb concentration and WBC count and insignificant change in RBC compared to control group (table 3).

Data presented in Table (4) showed the effect of burned plastic bags exhausts and antioxidant on spleen and bursa weight and HA titre against SRBCs. There were significant decreases in spleen, bursa weights and HA titre against SRBCs in G2 compared to the control group. These alternations returned to normalcy in group exposed to burned plastic bag exhausts plus antioxidant supplementation.

Table5 showed the activity of GSH, CAT and level of MAD in the serum of Japanese quail exposed to burn plastic bag exhausts. There were significant decrease in activity of GSH and increase in level of MAD in Japanese quail exposed to burn plastic bag exhausts (G2) compared to the control group. These changes returned to normalcy in group3 exposed to burned plastic bag exhausts plus antioxidant supplementation. There was significant increase in CAT in G3 compared to control group.

Data presented in Table (6) showed the effect of burned plastic bags exhausts and antioxidant on levels of serum ALT, AST, ALP, TP and Alb. There were significant increases in levels of AST and ALP and significant decrease in TP and Alb in G2 (burning plastic bags plus antioxidant) compared to the control group. In G3 most of these parameters showed insignificant change compared to control, except AST still higher than control and G2 group.

Data presented in Table (7) showed the effect of burned plastic bags exhausts and antioxidant on levels of serum urea, uric acid and creatinine. There were significant increases in levels of urea, uric acid and creatinine in G2 (burning plastic bags) compared to the control group. These alternations still higher in group exposed to burn plastic bag exhausts plus antioxidant supplementation, except urea in significant change compared to control group.

Table 8 showed the effect of burned plastic bags exhausts and antioxidant on levels of serum Ca, Mg, P, Na and K. There were significant increases in Mg, P and Na but significant decrease in Ca and K. in G2 compared to control group. These electrolytes returned to normalcy in G3, except P and Mg still higher compared to control group.

There was significant increase in level of aldosterone in Japanese quail exposed to burned plastic bag exhausts. Administration of antioxidant combined with burned plastic bag exhausts improved this increase to normal value (fig 2).

Table (2).Body weight andTriiodothyronine (T3) of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

Groups / Age	G1	G2	G3
1st week	**12.7±5.2**		
2nd week	**36.2 ±1.8 b**	**35.6 ± 2.7 b**	**45.1± 1.6 a**
3rd week	**102.7± 2.2 a**	**65.1± 4.3 c**	**80.8 ± 2.1 b**
4th week	**128.9 ± 3.6 a**	**91.7 ± 6.4 c**	**111.7 ± 11.9b**
5th week	**156.4 ± 5.6 a**	**141.4± 8.5 c**	**167.1 ± 14.8 a**

Values are shown as means ± SD.

Different small letters in the same row indicate significant difference at $P< 0.05$

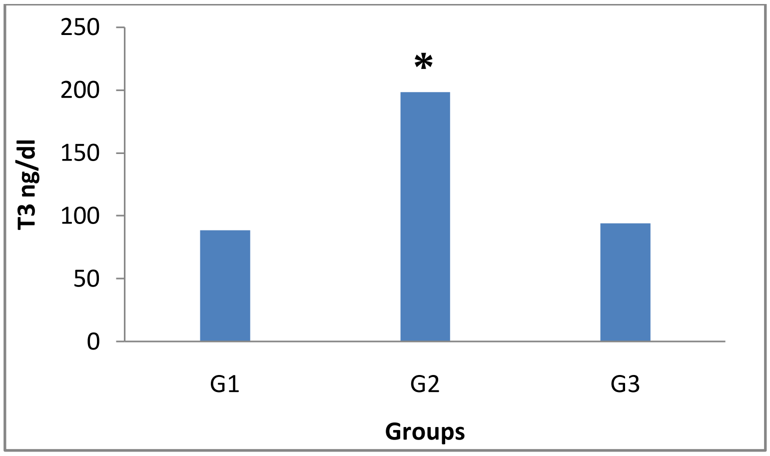


Figure (1).Triiodothyronine (T3) of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants, *P < 0.05, versus control.

Table (3).Haematological parameters of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

Groups / Parameters	G1	G2	G3
RBCs $\times 10^6$mm^3	**4.99 ±0 .18[a]**	**3.85 ± 0.46[b]**	**5.23 ±0.17 [a]**
Hb mg/dl	**14.07 ± 1.42 [b]**	**4.23± 0.20 [c]**	**16.41± 1.9 [a]**
WBCs $\times 10^3$mm^3	**13.67 ±1.37[b]**	**8.33 ± 1.86[c]**	**16.0 ±0.89 [a]**

Values are shown as means ± SD of N=6.
Different small letters in the same row indicate significant difference at P< 0.05

Table (4). Spleen and bursa weight (gm) and HA titre against SRBCs of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

Groups / Parameters	G1	G2	G3
Spleen wt.	0.07 ±0.01[a]	0.05± 0.01[b]	0.08±0.02[a]
Bursa wt.	0.09 ± 0.01 [b]	0.02± 0.001 [c]	0.12± 0.03 [a]
Antibody titre (HA) against SRBCs	5.67 ±1.37[a]	1.67 ± 0.52[b]	5.33 ±1.36 [a]

Values are shown as means ± SD of N=6.
Different small letters in the same row indicate significant difference at P< 0.05

Table (5). Activity of reduced glutathione (GSH), catalase (CAT) and level of malondialdehyde (MAD) in serum of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

Groups / Parameters	G1	G2	G3
GSH (µ mol/l)	**6.65 ±1 .18[a]**	**4.20 ± 0.56[b]**	**5.47 ±1.06 [a]**
MAD (µ mol/l)	**2.26 ± 0.36 [b]**	**4.58± 0.93 [a]**	**2.67± 0.22 [b]**

CAT (µ mol/l)	**0.94 ±0.23[b]**	**0.83± 0.06[b]**	**2.98 ±0.44 [a]**

Values are shown as means ± SD of N=6.
Different small letters in the same row indicate significant difference at $P< 0.05$

Table (6):liver function tests of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

Groups / Parameters	G1	G2	G3
ALT (U/L)	**50.8 ± 4.9[a]**	**49.8 ± 5.64[a]**	**44.2 ± 2.6[a]**
AST (U/L)	**94.7±3.9[c]**	**130.6±13.6[b]**	**154.7±10.2[a]**
ALP	**314.9 ±11.4[b]**	**400.8± 31.9[a]**	**348.1± 37.3[b]**
TP (mg/dl)	**4.68 ± 1.5[a]**	**2.5 ± 0.54[b]**	**4.73 ± 0.67[a]**
Alb (mg/dl)	**1.68 ± 0.09[a]**	**0.99 ± 0.17[b]**	**1.65 ± 0.35[a]**

Values are shown as means ± SD of N=6.
Different small letters in the same row indicate significant difference at $P< 0.05$

Table (7):Kidney function tests of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

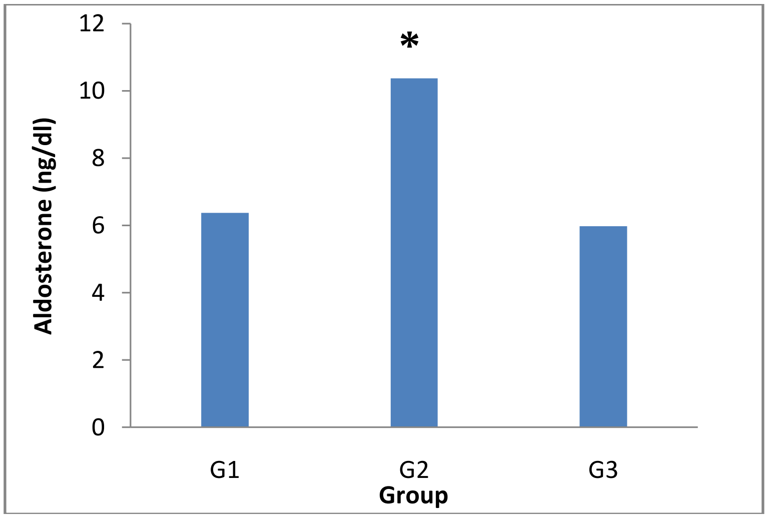
Groups / Parameters	G1	G2	G3
Urea (mg/dl)	**2.79 ±0.78[b]**	**5.86 ± 0.51[a]**	**2.53 ±0.44 [b]**
Uric acid (mg/dl)	**6.0 ± 0.17 [b]**	**7.51± 0.39 [a]**	**7.14± 0.4 [a]**
Creatinine (mg/dl)	**0.54 ±0.1[b]**	**1.74± 0.89[a]**	**1.21±0.08[a]**

Values are shown as means ± SD of N=6.
Different small letters in the same row indicate significant difference at $P< 0.05$

Table (8).Serum electrolytes of Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants.

Group / Parameters	G1	G2	G3
ca (mg/dl)	**10.7 ±1.03[a]**	**7.14± 0.81[b]**	**11.3±2.6[a]**
P (mg/dl)	**7.09 ±0.74[b]**	**10.34± 0.43[a]**	**9.69±0.89 [a]**
Mg (mg/dl)	**2.28 ± 0.12 [b]**	**3.33± 0.63 [a]**	**2.87± 0.08 [a]**
Na (u/l)	**135.7± 2.72[b]**	**144.77± 0.58[a]**	**134.47± 3.9[b]**
K (u/l)	**2.7± 0.09[a]**	**2.37± 0.23 [b]**	**2.65± 0.04[a]**

Values are shown as means ± SD of N=6.
Different small letters in the same row indicate significant difference at $P< 0.05$



Figure(2).Serum aldosteroneof Japanese quail exposed to burned plastic bag exhausts and supplemented with antioxidants, *P < 0.05 versus control.

Discussion

Some toxic substances such as PAH, furan, TCDD, CO_2, CO, heavy metals and other biochemically important constituents are generated during burned plastic bag(**Larsen et al., 1994; Wang et al., 1999; Valavanidis et al.,2008).**The results in table2 illustrated that synthetic (mixture of vit. E and A) feed additives can alleviated the negative effect of burned plastic bag exhausts on body weight. **Ciftci et al. (2010)** showed that 2 microg/kg dose of 2,3,7,8-TCDD caused significant (P<0.01) reductions in the body weight gain of rats. In L-E rats TCDD caused a striking, progressive body weight loss, which amounted to about 30% of initial body weight by day 10 (**Lindén et al., 2014**).At the same time, **El-Metwally (2003)** reported that vit. E supplemented diet was significantly lower body weight loss in hens.

The observed decrease in the mean body weight of the animals in the present study might be attributed to the disturbed basal metabolic rate also; **Arisawa et al (2005)** found that TCDD causes endocrine disruption of thyroid gland which was observed in the present study (Fig1).**Yoshizawa et al (2010)** showed that administration of TCDD to female Harlan Sprague-Dawley rats induce significant increase in triiodothhyronine. **Ivens et al (1992)** reported a significant increase in triiodothhyronine after single oral dose of 2,3,7,8-tetrabromodibenzo-p-dioxin (2,3,7,8-TBDD) in rats.

Haematological parameters are good indicators of the physiological status of animals (**Khan and Zafar, 2005**). Blood acts as a pathological reflector of the status of exposed animals to toxicant and other conditions (**Olafedehanet al.,2010**).The major functions of the white blood cell and its differentials are to fight infections, defend the body by phagocytocis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response. Thus, animals with low white blood cells are exposed to high risk of disease infection(**Soetanet al., 2013**).In this study, burned plastic bags exhausts were significantly decreases RBCs, Hb concentration, WBCs, spleen and bursa weights and HA titre against SRBCs compared to the control group. These changes in hematological and immunological parameters as well are probably due to hematotoxicity and immunosuppressive effects of toxic gases released from burning plastic bags. Results showed that exposure of Japanese quail to burned plastic bag exhausts led to occurrence of anemia as indicated by significant decrease in RBCs count, HB concentration. **Funseth and IIback (1992)** found significant decrease in RBCs count in the TCDD treated rats on day 28.Some authors attributed the induced anemia by TCDD toxicity to apoptic cell death in circulating erythrocytes which coupled with the inability of bonemarrow to compensate the increased rate of destruction due to myelotoxic effect of TCDD on bone marrow (**Abd El-Nasser et al., 2008**). Anemia could also be attributed toTCDD induced oxidative stress through its effect on AhR mediated pathway, leading toinduction of α-aminolevulinic acid synthetase which is the initial and rate limiting enzyme in heme synthesis (**Conollyand Anderson, 1991**). **Latif et al. (2010)** showed that Benzo[a]pyrene (BaP) was intratracheally administered to 1-d-old chicks for 5 consecutive days induce significant decrease in RBC,Hb and WBC.

The decrement of WBC count suggests a direct effect of burned plastic bags exhausts on the hemopoietic tissues or an increase in the rate of destruction of the circulating leucocytes, or both (**Mitchell and Johns, 2008**). **Abd El-Nasser et al. (2008)** demonstrated that oral exposure to TCDD resulted severe decreases in leukocyte counts as well as in the percentages of lymphocytes, monocytes and eosinophils. TCDD administered intraperitoneally or orally to mice induced a strong immunosuppressive effect on antibody production and cell-acquired immune responses (**Garattini et al., 1982**).

Vitamin E +A supplementation canceled the negative effect of burned plastic bags exhausts on RBCs, Hb concentration, WBCs, spleen weight, bursa weight and HA titre against SRBCs. **El-Aroussi et al. (2007)** reported that vitamin E supplementation increased RBCs and WBCs count and Hb concentration. The antioxidative property of vitamin E in chickens is suggested to have significant role in the development of immune response through protection of the cells, such as lymphocytes, macrophages, and plasma cells from oxidative damages, and enhances the function and proliferation of these cells in face the oxidative stress (**Meydani and Blumberg,1993)**.Vitamin A is one of the most widely studied nutrients in relation to immune function (**Tanumihardjo, 2011**).

The antioxidant defense GSH plays an important role in the scavenging of reactive oxygen species (ROS) and free radicals (**Hashimoto et al., 2008**). Increased level of MDA level is a marker of lipid peroxidation (**Gawet et al., 2004**). The obtained data in this study showed that the significant and nonsignificant decrease in GSH and CAT respectively, and increase in MAD with exposure to burned plastic bags exhausts. This may be due to effect of toxic gases released from burning plastic bags which may lead to higher formation rate of free radicals. Oxidative stress from TCDD exposure in laboratory animals increases the production of ROS, lipid peroxidation and DNA damage (**Muhammadpour et al., 1988**).

Briede et al(2004) reported that suppression of the antioxidant defense by PAH, especially benzo[a]pyrene (BaP) through aryl hydrocarbon receptor (AhR), leads to the generation of ROS. This in turn probably incited increased oxidative stress, as substantiated by increased MDA levels (**Alonso-Alvarezet al., 2007 and Latif et al., 2010**) seen in the liver, lung, and plasma. Also, it seems that the carbon particles of the soot are toxic by inducing peroxidation through free radical mechanisms (**Sagai et al., 1993**).

The oxidative damage mediated through the generation of ROS is considered to be the function of the overall balance between the oxidant and antioxidant levels of a specific tissue (**Andrews et al., 1977**). Vitamin E, a chain breaking antioxidant eliminates lipid peroxyl and alkoxyl radicals and therefore suppresses the chain reaction of lipid peroxidation and promotes the production of scavenger antioxidant enzymes (**Phull et al.,1995**).Thus, our results claim that administration of Vitamin E plus A, a well-known antioxidant can able to protect the oxidative damage induced by burned plastic bags exhausts.**Ganguly et al.(2010)** found that Vitamin E, can protect the major profiles of normal oxidative state of rat liver from the detrimental effects of benzene at 500 mg/kg body weight/day.

In G2 treated quails, the increase in serum AST, and ALP activities and decrease in serum total protein and albumin are probably due to degenerative changes of the hepatocytes (**Mukherjee, 2003). Ullaet al.(2003)** stated a significant elevation of AST was found in adult female rats given a single oral dose of 0.03 µg TCDD/kg Bwt..**Abd El-Fattahet al.(2013)**reported that TCDD decreased serum albumin and albumin / globulin ratio. While it caused an increase in liver relative weight, serum total protein, globulin, aspartate and alanine amino transferases and alkaline phosphatase. **Chen et al (2006)** reported that serum ALT, AST and GGT level were significantly higher in coke oven workers exposed to polycyclic aromatic hydrocarbons (PAHs).

The kidney participates in the maintenance of the constant extracellular environment that is required for adequate functioning of the cells. This is achieved by excretion of waste products of metabolism (such as urea, creatinine and uric acid) and by specifically adjusting the urinary excretion of water and electrolytes to match the net intake and endogenous production. Alteration from the normal levels of these waste products and electrolytes in blood, which may be caused by several factors, is an indication of renal impairment (**Gidado et al., 2001 and Zannan et al., 2008**).

In this study, exposure to burned plastic bags exhausts is reported to be among the predisposing factors to the impairment of kidney function in Japanese quail. From the result of this study, increase in the level of serum creatinine, urea, uric acid, Mg, P and Na, as well as decrease in the levels of serum Ca and K are reported in Japanese quail following exposure to burned plastic bags exhausts. These results indicate that the absorbed constituents of these vapors and / or their metabolites might have reacted and interacted with the renal tissues to impair the kidney functions (**Colies, 1986**).

Abd-El-Baset and Abd El-reheem(2008) who observed a significant decline of calcium and increase in sodium after five weeks of exposure of rats to cadmium. Such variation was related to the decreased calcium absorption seen in rats during cadmium exposure (**Feldman and Cousins, 1974**) since cadmium competes with calcium absorption.

Aldosterone is made by the adrenal glands located over the superior portion of the kidneys. It is a hormone that acts upon the nephron tubules stimulating the resorption of sodium. Therefore it contributes to the increase of the blood osmolarity and consequently to the increase of the blood pressure (**Clauss et al., 1984**).

The present data showed an elevated serum aldosterone in G2 when compared with the control. This may be due to toxic stress of substances released from burned plastic bags. The increase in aldosterone hormone leads to decrease K and increase Na in the blood.

Conclusion

In our study, inhaled burned plastic bag exhausts in birds as an experimental models induced oxidative stress, changed hematological parameters, effect on immunity, damage of liver and kidney function. We conclude that alteration of these parameters due to inhaled burned plastic bags exhausts may be partially improved following vitamin E +A administrate. So, plastic should not be burned but it should be recycled when possible and sent to the landfill if no recycling options are available. Also, vit.E and vit.A should be added to diet to reduce toxic effect of burning plastic in opening area.

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