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Hematological, physiological and biochemical effects-induced in female albino rats after chronic administration of Cinnamomum camphora oil

Mohamed, N.A. and El -Massry, A.A.
Department of Zoology, Alexandria University, Alexandria, Egypt
Dr. Nema Abdelhameed Mohamed
Department of Zoology, Alexandria University, Alexandria, Egypt
Email: science20111@hotmail.com
Azza Ahmed El -Massry
Department of Zoology, Alexandria University, Alexandria, Egypt
E mail: nadahafez7@gmail.com

ABSTRACT

This present study was aimed to investigate hematological and physiological effects of different concentrations of camphor oil on selected organs of female albino rats. Camphor oil at doses of 400, 500 and 600 µl/kg body weight/day was administered intraperitoneally for 28 days.

The obtained data revealed significant decrease in RBC' s, Hb, Hct and PLT in camphor oil treated rats. The prominent features of WBC's, after the camphor oil treatment, were leucopenia, neurtophilia, monocytosis and lymphopenia. However, the camphor oil had no significant effect ($P<0.05$) on MCH, MCHC, MCV and RDW when compared with controls. The activities of diagnostic marker enzymes, including AST and ALT plasma levels were markedly increased in camphor oil treated rats. Daily intraperitoneal treatment with camphor oil resulted in significant ($P<0.05$) increment in plasma urea, creatinine and without any differences in total proteins. Total lipid, triglycerides, total cholesterol, LDL-cholesterol, VLDL-cholesterol and HDL-cholesterol were decreased in treating rats as compared to the control group. All the treated groups showed an increase in FSH, LH, progesterone and estrogen concentrations. Furthermore, the different doses of camphor oil caused a decrease in PRL concentration. Body weight and organ/body weight ratios were significantly increased after camphor oil treatments.

The present results show that camphor oil has adverse health effects and consequently camphor remains a product with the potential for serious toxicity.

Indexing terms/Keywords

Camphor oil, hematology, liver, kidney, ovary, rats.

Academic Discipline And Sub-Disciplines

Zoology, Physiology, Toxicity

SUBJECT CLASSIFICATION

Biology

TYPE (METHOD/APPROACH)

Experimental

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INTRODUCTION

Camphor ($C_{10}H_{16}O$) is a ketone body from camphor laurel wood (*Cinnamomum camphora,* family Lauracae), a large evergreen tree found in Asia [1,2]. It is synthetically produced from turpentine oil and is present in many non-prescription medicines [3]. Camphor's purported medicinal benefits currently include local anesthetic, antipruritic, antiseptic and mild expectorant activity [4]. It exhibits a number of biological properties such as insecticidal, antiviral, antimicrobial, anticoccidial, anti-nociceptive, anticancer and antitussive activities, in addition to its use as a skin penetration enhancer. It is used as a secretolytic medicine for relieving respiratory symptoms [5,6]. It has a characteristic camphoraceous odor and is used in shining materials, toilet products, preservatives, cosmetics, religious ceremonies chewing gum and cigarette [7-9].

The camphor tree and its products, such as camphor oil, have been coveted since ancient times. Camphor is widely distributed in the essential oils of medicinal plants from various parts of the World. It was particularly used as a fumigant during the era of the Black Death [2] and considered as a valuable ingredient in both perfume and embalming fluid. Camphor oil is known for its ability to alleviate respiratory conditions such as coughing and congestion. Camphor oil may also be used as a liniment to relieve pain in the muscles or joints [10]. It is today mostly used in the form of inhalants and of camphorated oil, a preparation of 19% or 20% camphor in a carrier oil, for the home treatment of colds and as a major active ingredient of the liniments and balms used as topical analgesics [11]. It should be pointed out that the main constituents of the camphor essential oil was 1,8-cineole (73.01%) while the other constituents were as follows: camphor (9.18%); α-terpineol (2.14%); borneol (1.95%); p-cymene (1.65%) and terpinen-4-ol (1.05%) [12]

Thus, the camphor is a multipurpose molecule with a more diverse range of applications, ranging from being used to treat medical conditions in humans for being used as a natural poison to kill insects, which seems divergent. In fact, the toxicity of camphor in humans remains a cause for concern as many cases of accidental poisoning, with serious symptoms, have occurred. It can cause irritability and neuromuscular hyperactivity, blurred vision, nausea, vomiting, colitis, dizziness, delirium, contraction of heart muscles, difficulty breathing, seizures and death [13-15]

Considering these findings as well as the wide use of camphor in human therapy and their related chemical structure. It was aimed in this study to investigate their hemato-hepatorenal and sexual toxicities in normal female rats.

MATERIALS AND METHODS

Chemicals

The camphor oil was purchased from El-Captain Company (CAP PHARM), EL-Obour City, Egypt.

Experimental design

Forty adult female Sprague-Dawley rats (160-180g) were sorted randomly from the animal house of the High Institute of Public Health, Alexandria University, Egypt. They were allowed access to water *ad libitum* and maintained under standard conditions for acclimatization. The animal room was well ventilated with a temperature range of (22±2˚C) Under day/night, 12-12 hours photoperiodicity. Female rats (n=40) were divided into 4 groups (n=10); 3 groups were given intraperitoneal injections by different doses of camphor oil (400, 500 and 600 µl/kg b. w.) [16]; the control group was given distilled water for 28 days.

Hematology and plasma isolation

At the end of 28 days, blood samples were collected from overnight fasted animals through retro-orbital sinus puncture in ethylene diamine tetraacetic acid (EDTA) coated vials. Blood was collected for the analysis of hematological parameters such red blood cell count (RBC' s), hemoglobin content (Hb), hematocrit value (Hct), platelet count (PLT), white blood cell count (WBC's), and different white blood cell counts including lymphocytes, monocytes, neutrophils, and eosinophils by Particle Counter (ERMA Inc., Tokyo. Model PCE-210). Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and red blood cell distribution width (RDW) were thus determined. Plasma was separated by cold centrifugation at 3000 rpm for 10 min.

Biochemical parameters

Determination of liver and kidney functions

Plasma aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) activities, urea and creatinine levels were estimated by using F-200 fluorescence spectrophotometer according to the method described by Newman and Price [17]

Determination of lipid profile

Lipid profile (total lipids, triglycerides, total cholesterol, low density lipoprotein LDL-C and high density lipoprotein HDL-C) were measured using the commercially available kits (Diagnostic Systems Labs., Inc., USA) according to manufacturer's instructions. Very low density lipoprotein (VLDL-Cholesterol) was calculated according to Friedewald's Formula: VLDL = Triglycerides/5 [18]

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Determination of sex hormones

The plasma levels of follicular stimulating hormone (FSH), lutenizing hormone (LH), prolactin (PRL), progesterone and estrogen were determined by Cobase analyzers using commercial enzymatic kits (Diagnostic Systems Laboratories).

Body weight and organ/body weights ratios:

The body weight and organ weight were recorded for each experimental animal after one and four weeks of the experimental durations. After sacrifice, organ weights (liver, kidney and ovary) were recorded and organ/body weight ratio (organ weight/body weight x 100) were calculated as follows:

Organ/body weight ratio = Absolute organ weight (g) / Body weight on the day of sacrifice (g) X 100

Data analysis

Statistical analysis was conducted using SPSS program (Version, 16). ANOVA ($P<0.05$) was applied to reveal the impact of camphor oil effects on the hematological parameters, liver, kidney, ovary functions and body weight in female rats. Differences between individual means were estimated using Duncan-test.

RESULTS

Hematological parameters

Table 1&2 showed the effects of camphor oil on the hematological parameters in normal female rats. The overall pattern of hematological parameter changes following application of camphor oil is a dramatic drop in all experimental groups. The red blood cells (RBC's), hemoglobin content (Hb), hematocrit value (Hct), platelet (PLt) and white blood cell (WBC's) of camphor oil treated animals (G2, G3 and G4) were significantly lower ($P<0.05$) than those of control (G1). The maximum significant decrease obtained in G4 received 600 µl/kg b.w. as compared with the other two camphor oil groups. However, the camphor oil had no significant effect ($P<0.05$) on MCV, MCH, MCHC and RDW when compared with controls. Derived data showed a general significant rise in neutrophiles, monocytes, eosinophiles, basophiles and decline in lymphocytes number of all camphor oil treated rats.

Table 1: Hematological parameters in rats injected with different concentrations of *Cinnamomum camphora* oil

Group / Parameter	G1 (Control)	G2 (400 µl/kg)	G3 (500 µl/kg)	G4 (600 µl/kg)
RBC's ($x10^6$/ mm^3)	8.936± 0.16913	8.001± 0.10781[a]	7.426± 0.4049[a,b]	5.430± 0.3674[a, b, c]
Hb (g/dl)	15.5± 0.3773	14.44± 0.3328[a]	13.76± 0.3108[a,b]	11.10± 0.2720[a, b, c]
Hct (%)	53.8± 1.6852	51.6± 1.2443[a]	50.2± 1.5937[a,b]	43.8± 1.4283[a, b, c]
PLt m/mm^3	660.00± 18.3216	507.80± 27.3978[a]	450.60± 35.2513[a,b]	374.4± 16.4942[a, b, c]
MCV	61.56± 1.4810	59.00± 2.1498	60.10± 1.0425	58.98± 1.6593
MCH	18.55± 0.4152	17.36± 0.4864	18.40± 0.6058	18.54± 1.3776
MCHC	30.20± 0.6829	29.48± 0.3382	30.42± 0.5808	29.90± 0.3720
RDW	19.38± 0.1067	19.32± 0.1392	19.88± 1.1302	19.80± 0.4509

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

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Table 2: WBC's and differential count in rats injected with different concentrations of *Cinnamomum camphora* oil

Group / Parameter	G1 (Control)	G2 (400 µl/kg)	G3 (500 µl/kg)	G4 (600 µl/kg)
WBC's ($x10^3/mm^3$)	12.98± 0.7109	11.00± 0.6265 [a]	10.48± 1.4878 [a,b]	8.02± 0.3768 [a, b, c]
Neutrophiles	51.00± 2.2045	60.20± 3.2155 [a]	68.00± 3.2155 [a]	72.20± 8.4990 [a, b]
Lymphocytes	43.60± 2.1118	33.10± 4.0792 [a]	21.40± 3.6524 [a, b]	14.40± 0.9798 [a, b, c]
Monocytes	2.60± 0.7483	3.00± 0.5831 [a]	4.90± 0.7071 [a, b]	5.40± 1.5684 [a, b, c]
Eosinophils	1.60± 0.4000	1.80± 0.2449 [a]	2.20± 0.5831 [a, b]	3.60± 0.4100 [a, b, c]
Basophiles	1.20± 0.6533	1.90± 0.5231 [a]	3.50± 0.4730 [a, b]	4.40± 0.3352 [a, b, c]

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

Liver and kidney function

Table 3 showed the levels of AST, ALT, total protein, urea and creatinine in plasma of normal and camphor oil treated rats. Intraperitoneal administration of camphor oil (400, 500 and 600 µl/kg b.w.) for 28 days significantly ($p<0.05$) increased the activities of liver enzymes and creatinine meanwhile urea concentrations were decreased when compared to control rats (Table, 2). The enhancement of liver enzymes was pronounced in G4 than that in G2 and G3. On the other hand, camphor oil administration had no significant effect ($P<0.05$) on plasma total protein levels.

Table 3: **Liver and kidney functions in rats injected with different concentrations of *Cinnamomum camphora* oil**

Group / Parameter	G1 (Control)	G2 (400 µl/kg)	G3 (500 µl/kg)	G4 (600 µl/kg)
AST (IU/L)	147.60± 5.1633	168.00± 8.3246 [a]	170.80± 4.4429 [a]	200.00± 10.2732 [a, b, c]
ALT (IU/L)	26.00± 0.0066	27.00± 1.4491	32.00± 0.9695 [a]	42.80± 4.7895 [a, b, c]
Total protein (g/l)	8.38± 0.5180	8.00± 0.3023	8.40± 0.2701	8.42± 0.4701
Urea (mg/l)	38.00± 1.8708	36.00± 0.4472 [a]	32.00± 1.6552 [a, b]	27.00± 2.2494 [a, b, c]
Creatinine (mg/l)	00.41± 0.2267	00.44± 0.3441	00.56± 0.6657 [a, b]	00.72± 0.5941 [a, b, c]

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

Lipid profile

Table 4 showed the effect of camphor oil on plasma lipid profile. There were significant ($P<0.05$) decrease in the level of total lipids, triglyceride, total cholesterol, LDL-C, VLDL-C and HDL-C in camphor oil treated rats as compared with normal group.

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Table 4: lipid profile in rats injected with different concentrations of *Cinnamomum camphora* oil

Group / Parameter	G1 (Control)	G2 (400 µl/kg)	G3 (500 µl/kg)	G4 (600 µl/kg)
Total lipid (mg/dl)	298.40± 12.9040	279.20± 13.6931 [a]	258.00± 10.6587 [a, b]	219.00± 8.1706 [a, b, c]
Triglycerides (mg/dl)	99.85± 6.2304	95.47± 6.2450 [a]	87.60± 7.0042 [a, b]	82.80± 5.2271 [a, b, c]
Total Cholesterol (mg/dl)	101.20± 7.3212	98.50± 6.5696 [a, b]	87.80± 6.2960 [a]	69.00± 5.3385 [a, b, c]
LDL-C (mg/dl)	41.20± 0.2000	40.40± 0.2437	32.60± 0.2449 [a, b, c]	29.40± 1.6309 [a, b, c]
VLDL-C (mg/dl)	19.20± 1.7720	18.60± 1.2083	17.80± 1.2226 [a]	16.50± 1.0677 [a, b, c]
HDL-C (mg/dl)	40.80± 7.7756	29.50± 5.2915 [a]	27.40± 5.2915 [a, b]	23.10± 1.5362 [a, b, c]

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

Sex Hormone Levels

In the present study hormonal assay revealed that the camphor oil injection was accompanied by a reduction in PRL levels. On the other hand, FSH and LH were increased when compared with control group (Table, 5). A significant (P<0.05) dose dependant increase in plasma progesterone and estrogen levels were observed in camphor injected animals G2 (400 µl/kg), G3 (500 µl/kg) and G4 (600 µl/kg) compared to control group.

Table 5: Sexual hormones in rats injected with different concentrations of *Cinnamomum camphora* oil

Group / Parameter	G1 (Control)	G2 (400 µl/kg)	G3 (500 µl/kg)	G4 (600 µl/kg)
PRL (ng/ml)	3.74± 0.3010	2.84± 0.4467 [a]	1.74± 0.5582 [a, b]	1.24± 0.6038 [a, b, c]
LH (mIU/ml)	1.60± 0.1000	1.72± 0.0663 [a]	2.32± 0.2817 [a, b]	3.18± 0.0860 [a, b, c]
FSH (mIU/ml)	2.54± 0.1224	2.78± 0.1356 [a]	2.94± 0.2712 [a, b]	3.50± 0.1048 [a, b, c]
Progesterone (ng/ml)	5.77± 0.1975	8.88± 0.8121 [a]	9.37± 1.1802 [a, b]	12.90± 1.2594 [a, b, c]
estrogen (pg/ml)	9.39± 1. 5937	10.04± 1.6597 [a]	10.12± 1.4646 [a, b]	17.66± 0.8340 [a, b, c]

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

Body weight (BW)

All treated rats showed significant (P<0.05) increase in the whole body weight as compared to control rats during the exposure period. The BW was significantly (P<0.05) higher in G4 than that in G2 and G3 from the first week onward (Table 6). A significant dose dependant increase in the liver, kidney and ovary weights/body weight ratios were observed in camphor injected animals compared to control group (Table 7).

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Table 6: Body weight in rats injected with different concentrations of *Cinnamomum camphora* oil

Group / Parameter	G1 (Control)		G2 (400 µl/kg)		G3 (500 µl/kg)		G4 (600 µl/kg)	
	1st week	4st week	1st week	4st week	1st week	4st week	1st week	4st week
Body weight	166.00± 3.668	187.00±9.884	174.00±6.126 [a]	188.00±11.777	183.60± 5.608 [a,b]	193.00± 9.884 [a,b]	189.00± 11.289 [a,b]	206.00± 11.496 [a,b,c]

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

Table 7: Organ/body weight ratios (Organ weight/Body weight x100) in rats injected with different concentrations of *Cinnamomum camphora* oil

Group / Parameter	G1 (Control)	G2 (400 µl/kg)	G3 (500 µl/kg)	G4 (600 µl/kg)
Liverweight/body weight ratio	0.06010± 0.00382	0.06250± 0.00330 [a]	0.06260± 0.00326 [a]	0.06290± 0.00459 [a,b,c]
Kidneyweight/body weight ratio	0.01180± 0.00095	0.01320± 0.00036 [a]	0.01350± 0.00040 [a]	0.01620± 0.00055 [a,b,c]
Ovaryweight/body weight ratio	0.00130± 0.00005	0.00150± 0.00004 [a]	0.00160± 0.00020 [a,b]	0.00540± 0.00128 [a,b,c]

Values are given as means ± SE; n = 10 in each group. Mean values in each raw having different superscript (a, b, c) are significant.

DISCUSSION

The current anemic effect of camphor oil probably due to a suppressive and toxic effect on bone marrow and subsequently on hematopoiesis and at very high concentration may induce anemia in animals on prolong feeding. This anemic status agrees with the works of Kieser et al. [19] who stated that 3-(4-Methylbenzylidene)-camphor has trend to reduce red blood cell count, hemoglobin content and PCV in the male dog after two weeks. Soghoian et al. [20] found that ingestion of one or more whole camphor mothballs had caused hemolytic anemia. The reduction in WBC's, could be correlated to suppression of leukocytosis from the bone marrow [21] The present neutrophilia may be related to poisoning (lead, camphor, antipyrine) as reported by Lester [22].

Liver intoxication has increased as a result of exposure to high levels of environmental toxins [23]. This is because the liver has an important role in the detoxification [24] When liver is injured or damaged, additional AST and ALT are released into the blood stream, causing levels of the enzymes to rise. AST usually rises in conjunction with ALT to indicate hepatocellular injury. These findings may suggest hemolysis or more generalized tissue damage due to camphor toxicity. These results cameaccordance with Dufour et al. [25]. In the same trend, the data obtained by Banerjee et al. [26] who stated that camphor (50, 150 and 300 mg Kg^{-1}) can modulate the activities of hepatic enzymes involved in phase I and phase II drug metabolism in female Swiss albino mice.

Ford et al. [27] stated that the gastrointestinal symptoms of camphor toxicity may include hepatic enzymes elevation. Fatma [28] reportd that ethanolic camphor leaves extract induced a general increase in AST, ALT and ALP enzymes activity and depletion in glycogen content and total protein in the plasma of two birds species. Litovitz et al. [29] found that a high AST-ALT ratio have been observed of camphor poisoning. El-Mahrouky et al. [30] found that a house sparrow treated of camphor leaf extract induced a gradually significant increase in plasma AST and ALT activities at intervals 3, 6, 12, 24, and 48 hours post-treatment. Camphor has been reported to cause reversible hepatotoxicity in extreme cases [31,32]. Also, ingestion of camphor can cause severe liver damage after exposure to camphor through the skin [33]. The highly significant decrease in serum urea concentrations of camphor oil treated rats may be due to inhibition in protein degradation and low deamination takes place that consequently leads to the formation of low amount of ammonia which is eventually converted to urea. In advanced liver disease urea synthesis is often depressed, leading to accumulation of NH_3, an ominous sign of liver failure [34].

As in humans, the majority of drugs administered to animals are eliminated by a combination of hepatic metabolism and renal excretion [35]. Though that the kidney plays a major role in drug metabolism through its excretory function. The obtained results revealed that the camphor oil has an adverse effect on kidney function and this effect may be due to glomerular filtration and tubular necrosis. These findings corroborates the work of Shalaby et al. [36]. Hassan and Waheed [37] stated that camphor and methomyl induced increase in plasma creatinine of palm dove at intervals 3, 6, 12 hours only. Also, Gilbert et al. [32] stated that camphor can cause renal damage.

Camphor has effects on several metabolic parameters such as lipid homeostasis. Camphor administration caused hypolipidemic effect and this may be due to linalool and cineole (major oil constituents of C. *camphora*) which have hypolipemic, lipid metabolism regulator, cholesterol synthesis inhibitor, anticholelithogenic and cholesterol antagonist effects. This observation is in consonance with the findings recorded with Chelliah [38]. Seidlova-Wuttke et al. [39,40] found that camphor (4MBC) treatment reduced serum triglycerides, the size of fat depots and serum leptin, a lipocyte-derived hormone, when compared to control animals.

Administration of camphor oil increased plasma FSH and LH suggesting the stimulation of hypothalamic–pituitary–gonadal axis. These results cameaccordance with Carou et al. [41]. Evidence from previous experiments have shown that the camphor oil is a fertility reducer. Also, the data of this research showed the estrogenic effect of camphor oil by increment in progesterone and estrogen levels. These results were confirmed by Seidlova´-Wuttke et al. [40]. The synthesis and secretion of estrogen is stimulated by follicle-stimulating hormone (FSH), which is, in turn, controlled by the hypothalamic gonadotropin releasing hormone (GnRH). In sexually-mature females, FSH (assisted by LH) acts on the follicle to stimulate it to release estrogens. Whilst, prolactin was decreased after camphor oil treatment. Camphor is known for its use for modulating sexual activity, contraception, inducing abortion, and reducing milk production in lactating women [42]. Several researchers found that camphor component can interact with gonadotropins and gonadal hormones and concluded that camphor causes adolescence retardation and reduction of reproductive organ volumes in both sexes [43]. Different ultra violet filters that contain up to 4% camphor (4-MBC) exhibited estrogenic effect if applied in animals [44,45]. It was demonstrated that camphor (3BC) had an adverse effect on the reproduction of fathead minnows in a dose-dependent manner [46]. Also, camphor activates estrogenic gene expression [47] and estrogen receptor activity [48]. Currently, the potential of transdermal permeation is explored to certain groups of benzophenones or camphor derivates which have particularly controversial properties - to cause potential adverse changes in the endocrine system of the body [49-51]

Results obtained in the present investigation indicate that body weight gain was influenced by camphor treatment in time and dose-dependent manner as compared to control rats. These results agree with the study of Ttinwell et al. [52] who stated that immature female rats subcutaneously or orally injected with camphor (4MBC) (500–800 mg/kg) had significantly increased whole body weight compared to the controls. Fatma & Sabah [53] found that an increase in the body and reproductive system weight were recorded after camphor treatment. The increased body weight may be probably due to different effects of the camphor oil on the metabolism and physical activity [54,55]. Also, Seidlová-Wuttke et al. [40] stated that the increase in body weight in response to camphor involves increase in the reproductive system weight, which was explained as due to more liquid ambition. In contrast, Abou-Hashem [56] stated that camphor treatments (ethanol extract) caused significant reduction in the body weight of albino rats that may be due to loss of appetite.

Organ/body weight ratio is an index used to indicate inflammation or cell constriction. An increase in organ/body weight ratios may either indicate inflammation or an increase in the secretory ability of the organ while a reduction in the value of organ/body weight ratio may imply cellular constriction [57]. The liver, kidney and ovary weights/body weight ratios in the camphor oil groups were higher than those of the normal groups, suggesting the occurrence of the edema and inflammation of these organs as reported by Kamath and Rajini [58].

Camphor toxicity may be due to its ability to be absorbed through all routes of administration [59]. After its absorption and distribution, camphor undergoes hepatic metabolism: it is hydroxylated in the liver into hydrocycamphor metabolites. Hydroxylated metabolites are then conjugated with glucuronic acid in the liver to become soluble in water before being excreted in the urine [50,61&2]

CONCLUSION

In conclusion, this study revealed that camphor oil administration distorts and disrupts the functions of liver, kidney and ovary. Thus, the common use of cold remedies that contain camphor oil are usually not beneficial and may be potentially dangerous.

Recommendations

Healthcare providers should be aware of the variety of over-the-counter products containing camphor, the complications of overdose, and available treatment strategies.

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Author' biography

CURRICULUM VITAE

Personal data:

Name **:Nema AbdElhameed Mohamed**

Date of birth **:22/1/1965**

Nationality **:Egyptian**

Email **:science20111@hotmail.com**

Object **:Assi. Prof. physiology**

Qualifications **:**

1) **Ph.d. physiology ,Alexandria Univeresity , 1999.**

Specialized branch : physiology

Thesis: A comparative study between the protective effects of lasix and selenium or both on hepato-renal toxicities induced by the anticancer drug "Cisplatin" in adult male rabbit .

2) **M . A . Zoology, Alexandria university , 1994.**

Thesis : Some physiological, haematological and histological altalterations in *Claris lazera* (cat fish) induced by *Melia azedrach* derivatives .

3) **B . A . , Zoology, Alexandria Univeresity , 1987 (Excellent)**

Appoiontments :

1988-1994: Administrator in Faculty of Science, Alexandria University.

1994 -1999: Assistant lecturer inFaculty of Science,Alexandria University.

1999-2013: Lecturer in Faculty of Science, Alexandria University.

2013- uptile now: Assi. Prof. physiology

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Supervision:

1-The role of melatonin or both in modulating epinephrine-induced stress in male rats (Ph.D., Zoology Department, Faculty of Science , Alexandria University).

2- Physiological and toxicological evaluation of oyster mushroom (*Pleurotus ostreatus*) on fertility of male rats (MS C., Zoology Department, Faculty of Science , Alexandria University).

3- Role of α- lipoic acid on toxicity of endoxan drug in male rats (MS C., Zoology Department, Faculty of Science , Alexandria University).

4- Physiological and histological changes in catfish (*Clarias gariepinus*) inhabiting

polluted Maryout lake- Alexandria -Egypt and the possible protective effect of meso 2,3- dimercaptosuccinic acid (Ph.D., Zoology Department, Faculty of Science , Alexandria University).

5- Aphrodisiac and androgenic effect of some plant constituents on experimentally- induced male sexual dysfunction (MS C., Zoology Department, Faculty of Science , Baniseef University).

6-Evaluating the effect of L-Carnitine on Acrylamide induced toxicity in male rats (MS C., Zoology Department, Faculty of Science , Alexandria University).

7-The protective effect of some antioxidant against oxidative damage induced by chloride in pregnant rats (MS C., Zoology Department, Faculty of Science , Alexandria University).

8-Physiological studies on adult male rats after exposure to drug tramundin, noradenaline and serotonin reuptake inhibitor (MS C., Zoology Department, Faculty of Science , Alexandria University).

Puplications:

Title	Journal	Kind of search	Year
Some physiological and histological alterations in *Claris lazera*(cat fish) induced by *Melia azedrach* derivatives	J.Enviro.Biol.18(2)p.149-165	Msc.Thesis	1996
Some physiological and haematological alterations in *Claris lazera*(cat fish) induced by *Melia azedrach* derivatives	Bull.Fac.Sci.Alex.Univ.vol. 37 No.2 p107-130	Msc.Thesis	1997
A comparative study between the protective effects of Lasix and Selenium or both on Hepato-Renal toxicities induced by The anticancer drug "cisplatin"in adult male Rabbit	Journal of the Medical Research Institute vol.21 No.1	Phd.Thesis	2000
Preventive effect of Olive oil to experimental Menadione intoxication in female Guinea pigs	J.Egypt.Ger.Soc.Zool.vol. 36 (A) comparative physiology	Joint research	2001
Ameliorative effects of vitamin E and L-Methionine on Lead-iduced toxicity in male Guinea pigs	Journal of Medical Research Institute vol.25 No.3	Single	2004
The Effect of Different Dietary Fats on lipid profile, glucose,T_3,T_4 and iron levels in plasma of mice.	Egypt.J.Exp.Biol.(Zool.),Vol. 6, No.1:175-185.	Single	2010
The antihyperglycaemic effect of the aqueous extract of *Origanium vulgare* leaves in streptozotocin-induced diabetic rats.	Jourdan Journal for Biological Sciences Vol.6, No.(1), 31-38.	Joint research	2013
The Role of Melatonin and / or Vitamin B Complex against Hormonal Changes in Epinephrine-Stressed Rats	Jordan Journal of Biological Sciences (JJBS)Vol. 5, No. 4 (December), pp: 295-300.	Joint research	2012
The effect of melatonin and/or complex vitamin B_1, B_6, B_{12} in modulating epinephrine-induced stress in male rats.	Brazilian Archives of Biology and technology.Vol. No.	Joint research	2013
Effects of cinnamon and/or barley on some physiological parameters in streptozotocin diabetic rats	Egypt.J.Exp.Biol.(Zool.),Vol. 9, No.1:133-139.	Joint research	2013

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Conferences:

Name of conference	Postion	Date
1) The eighth scientific conference for society of Zoology	Faculty of Science Alexandria University	2000
2)The Second International conference for biological sciences	Faculty of Science Tanta University	2002
3)The second conference for egyption society of experimental biology	Faculty of Science Tanta University	2006
4)International conference on nanotechnology opportunities and challenges	Center of Nanotechnology King Abdulaziz University	2008
5)The six conference for egyption society of experimental biology	Faculty of Science Tanta University	2010

Courses :

Name	place	duration	Date
1) University teacher preparation	College of Education, Alexandria University	Seven days	1994
2) Evaluate the performance of student in education process	College of Education for preparing teachers	Two days	1425
3) Effective Presentation Skills	Faculty of Science Alexandria University	Three days	2005
4) Writing and publication of scientific research internationally	Faculty of Science Alexandria University	Three days	2006
5) The use of technology in teaching	Faculty of Science Alexandria University	Three days	2006
6) Design decision	Faculty of Science Alexandria University	Three days	2006
7) Recent trends in teaching	Faculty of Science Alexandria University	Three days	2006
8) How to protect the devices from viruses	College of Education for preparing teachers	Two days	1431
9) Statistical analysis using the Spss,	Faculty of Education of the Scientific Sections of King Abdul Aziz University	Two days	1430
10) Recent trends in teaching	College of Education for preparing teachers	Three days	1431

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Fourms:

Name	Place	Date
1) First Scientific Forum "The role of women in the service of the scientific community"	College of Education for girls scientific sections.	2006
2)Third Scientific Forum "return to nature in order to secure the health of"	College of Education for girls scientific sections	2008
3)The first scientific meeting "the development of teaching performance of university professor	Education for Girls Faculty of literary sections.	2009
4) The Fourth Scientific Forum "Scientific Research The Challenge and the aspirations	College of Education for girls scientific sections	2009
5)Forum Production Center fifth academic development of university education	University of King Abdul Aziz	2009
6)Forum Production VI Academic Development Centre of university education	University of King Abdul Aziz.	2010
7)Third Scientific Forum bottoms - the Women's world body of scientific miracles in the Quran and Sunnah.	College of Education for girls scientific sections	2011
8)Forum Production VII Academic Development Centre of university education -	University of King Abdul Aziz.	2011

Workshops:

Name	Place	Date
1. Integration of engineering analysis skills curriculum ideas	Faculty of Education	1427.
2. Environmental pollution and food and Radiation	Faculty of Education	1430.
3. Levels of objectives and formulation	Faculty of Education	1430
4. Levels of goal areas of cognitive - emotional – skill	Faculty of Education	1430.
5. File course	Faculty of Education	1430.

Subjects that have been taught:

1. General Zoology.
2. Principles of Taxonomy.
3. Parazitology.
4. Ecology and animal behavior.
5. Health education.
6. Physiology.
7. General Biology (Bio 110 for preparatory year).

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Participation in committees:

1) Member of the committees for laboratories, Faculty of Education to prepare teachers of King Abdulaziz University.

2) Member of the Development Committee, Faculty of Science Laboratory Branch girls, King Abdulaziz University.

3) Member of the committees for laboratories, Faculty of Science, Alexandria University.

Interests and areas of research:

Study the effect of chemical pollutants , carcinogens and toxic substances on physiological and biochemical parameters in experimental animals with the possibility of using the natural products and extracts of plant to identify their therapeutic effects in addition, the impact of these extracts on experimental animals infected with diabetes and obesity and several diseases and other health symptoms in order to contribute to the enrichment of the fields of applied science, medical, pharmaceutical, and that with respect to human beings.