Cairo University
Faculty of Veterinary Medicine

Effect of lead acetate on some organs of adult albino rats with possible protective trials

A thesis submitted by

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For the degree of the Ph.D

(Cytology & Histology)

Under Supervision of

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Supervision Sheet

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Abstract:

Lead (Pb) is a ubiquitous environmental and industrial pollutant with worldwide health problems. The present study was designed to investigate the neuronal and reproductive toxicity of Pb in albino rats and to evaluate the ameliorative role of garlic as well as *Spirulina maxima* against such toxic effects. Forty adult male rats were used in this study (10 rats/group). Group I: served as control, Group II: rats received lead acetate (100 mg/kg), Group III: rats received both lead acetate (100 mg/kg) and garlic (600 mg/kg) and Group IV: rats received both lead acetate (100 mg/kg) and spirulina (500 mg/kg) daily by oral gavage for one month. Exposure to Pb acetate adversely affected the measured acetyl cholinesterase enzyme activity, dopamine level, serum testosterone level, oxidative stress and lipid peroxidation parameters as well as caspase-3 gene expression in both brain and testicular tissues. Light and electron microscopical examination of the cerebrum, cerebellum and testis showed various lesions after exposure to Pb which were confirmed by immunohistochemistry. In addition, it adversely affected sperm concentration, motility and viability. On the other hand, administration of garlic and spirulina concomitantly with lead acetate ameliorated most of the undesirable effects. It could be concluded that, the adverse effects induced by lead acetate, were markedly ameliorated by co-treatment with *S. maxima* more than garlic.

Keywords: Lead, Garlic, Spirulina, Brain, Testis

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Contents

List of Abbreviation

ACh : Acetylcholine

AChE: Acetylcholinesterase

ACP : Acid phosphatase

AKP : Alkaline phosphatase

ATP : Adinosine triphosphate

BAX : BCL2-associated X protein

BBB : Blood Brain Barrier

BCl-2 : B- cell lymphoma 2 protein

BTB : Blood Testes Barrier

b.wt. : Body Weight

CAT : Catalase

CCL_4 : Carbon tetrachloride

CNS : Central Nervous System

DAS : Diallyl sulfide

DADS: Diallyl disulfide

DATS: Diallyl trisulfide

DMSA: 2, 3-meso-dimercaptosuccinic Acid

DNA : Deoxy-ribonucleic Acid

FSH : Follicle Stimulating Hormone

GFAP : Glial Fibrillary Acidic Protein

GPx : Glutathione Peroxidase

G6PDH : Glucose -6- phosphate dehydrogenase

GSH : Reduced Glutathione

GST : Glutathione S-Transferases

H & E : Hematoxylin and Eosin

H_2O_2 : Hydrogen Peroxide

HSP70: anti-heat shock protein 70

IHC : Immunohistochemistry

Kg : kilogram

LH : Luteinizing Hormone

LPO : Lipid Peroxidation

LPP : Lipid Peroxidation Product

MAO : Monoamine Oxidases

mg : Milligram

ml : Milliliter

nmol : Nanomol

NOS : Nitric Oxide Synthase

6-OHDA: 6-hydroxydopamine

Pb : Lead

PbAc : Lead Acetate

rER : Rough Endoplasmic Reticulum

ROS : Reactive Oxygen Species

Se : Selenium

sER : Smooth Endoplasmic Reticulum

SOD : Superoxide Dismutase

TEM : Transsmition Electron Microscope

μm : Micrometer

Zn^{2+} : Zinc ion

Fe : Iron

List of Figures