بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

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Faculty of Veterinary Medicine

Department of Clinical Pathology

Evaluation of *Moringa oleifera* Plant against Hepato-nephrotoxicity Induced by Lead Acetate in Rabbits

A Thesis submitted by

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ABSTRACT

Two experiments were conducted to evaluate the effect of *Moringa oleifera* leaf ethanol extract (MOLEE) as adjunct and prophylactic treatments of lead acetate-induced hepato-nephrotoxicity in rabbits. In the first experiment, 36 male New Zealand White rabbits were assigned into two groups. The first group (14 rabbits) served as normal control. The second group (22 rabbits) was administered orally lead acetate at a concentration of 40 mg/kg/day, 5 days/week for 8 weeks. At the 4th and the 8th week of treatment, 6 animals (3 animals at each period) of the second group were sacrificed while the remaining animals (16 rabbits) were assigned randomly into 2 subgroups (8 rabbits each): treated and non-treated. The first subgroup was orally given 1 mL phosphate-buffered saline for further 4 weeks while the second subgroup was administered orally (MOLEE) at a dose of 400 mg/kg/day for the same period. Blood samples were collected to determine hematological and serum biochemical parameters. Tissue specimens were collected from the liver and kidney for evaluation of the oxidant/antioxidant markers and for histopathological examination. Lead acetate exposure decreased the mean body weight gain, hematocrit, mean corpuscular volume, and lymphocytes' count. Moreover, it markedly increased counts of monocytes and platelets, serum enzyme activity, levels of creatinine, total cholesterol, triglycerides,

and low-density lipoprotein cholesterol. Malondialdehyde level was markedly increased while the reduced glutathione content was significantly decreased in liver tissue of lead intoxicated-rabbits. Histopathological alterations were also noticed in the liver and kidney of lead intoxicated rabbits. *Moringa oleifera* leaf ethanol extract significantly improved hematological and serum biochemical parameters and histopathological structure of the liver and kidney. The second experiment was conducted to evaluate (MOLEE) as a prophylactic treatment for lead induced hepato-nephro toxicity in rabbits. Liver and kidney function tests and oxidant/antioxidant markers were evaluated. Moreover, histopathology of liver and kidneys and the effect of long term *Moringa oleifera* treatment were performed. Forty eight male New Zealand White rabbits (4-6 weeks age, 1-1.5 kg b.wt.) divided randomly into four equal groups were used. The first group was kept as normal control, the second group was administered orally MOLEE at a dose of 400 mg/kg/day for 12 successive weeks, the third group was administered orally MOLEE at a dose of 400 mg/kg/day for 12 successive weeks simultaneously with lead acetate orally at a concentration of 40 mg/kg/day for 8 successive weeks. The fourth group was administered lead acetate orally at a concentration of 40 mg/kg/day for 8 successive weeks. *Moringa oleifera* significantly increased body gain, impacted positively on lipid profile, glucose, renal and liver functions. Histopathology of the liver and kidneys of rabbits treated with Moringa for one month revealed no histopathological alterations. It has been concluded that MOLEE has the ability to mitigate the alterations in biochemical and histopathological toxic effects caused by lead acetate.

Keywords: Lead, *Moringa oleifera*, rabbits, hemogram, liver and kidney functions, oxidant/antioxidant markers, histopathology.

Dedication

Dedicated to my lovely family

Who Encouraged and Supported Me to Overcome

This Hard Work

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LIST OF ABBREVIATIONS

Abbreviation	Complete Words
ALT	Alanine aminotransferase
ALP	Alkaline phosphatase
ANOVA	Analysis of variance
AST	Aspartate aminotransferase
Ca	Calcium
Cu	Copper
DNA	Deoxyribonucleic acid
GSH	Reduced glutathione
Hb	Hemoglobin
HCT	Hematocrit
H&E	Hematoxylin and Eosin
HDL-C	High density lipoprotein cholesterol
LDL-C	Low-density lipoprotein cholesterol
MCV	Mean corpuscular volume
MCHC	Mean corpuscular haemoglobin concentration
MDA	Malondialdehyde
Mg	Magnesium
***M. oleifera* - MO**	*Moringa oleifera*
MOLEE	*Moringa oleifera* ethanol extract
Pb	Lead
PLT	Platelets
RBCs	Red blood cells
ROS	Reactive oxygen species
TC	Total cholesterol
TG	Triglycerides

Chapter 1

Introduction

Chapter (1)

1. INTRODUCTION

Lead has been extensively used in different industries for thousands of years. It is one of the most important and widely encountered environmental and industrial poisonous pollutants because it is widely present in the soil, water, and food **(Staessen *et al*., 1992; Payton *et al*., 1994; Kim *et al*., 1996; Ramah *et al*., 2015).**

Lead is the most well- studied toxic metal, and its biological effect is dependent on the level and duration of the exposure. This element is known to induce a broad range of physiological, biochemical, histological and behavioral dysfunctions in animals and humans, including dysfunctions in the nervous system **(Flora *et al*., 2006)**, kidneys which are the main route by which lead is eliminated **(Rastogi, 2008)**, liver **(Kasten-Jolly *et al*., 2010)** and reproductive system **(Flora *et al*., 2011).** Although adults are vulnerable to lead poisoning, children and infants are more at risk due to their lower tolerance and immature immune systems **(Plumlee *et al*., 2013)**.

Lead toxicity can lead to carcinogenicity **(Landrigan *et al*., 2000)**, haematological abnormalities **(Iavicoli *et al*., 2003)**, cardiac damage **(Patra and Swarup, 2004)**, immunological alterations **(Shah and Altindag, 2005)**, metabolic and reproductive disorders **(Teijón *et al*., 2006)** and nerve dysfunction **(Ademuyiwa *et al*., 2007)**.