بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

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

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Assessment of the role of total antioxidant capacity and troponin I as possible predictors for phosphides -induced cardiotoxicity

(A prospective study in the poison control center of Ain Shams University Hospitals)

Thesis

Submitted for partial fulfillment of master degree in Clinical Toxicology

By

Marwa Mohamed Abdel Wahab

(M.B.B.Ch., Ain Shams University)

Demonstrator at Forensic Medicine and Clinical Toxicology Department

Under Supervision of

Prof. Dr/ Sawsan Abd El-Fattah Shalaby

Professor in Forensic Medicine and Clinical Toxicology department

Faculty of Medicine-Ain Shams University

Prof. Dr/ Eglal Hassan El Awady

Professor in Forensic Medicine and Clinical Toxicology department

Faculty of Medicine-Ain Shams University

Dr/ Rania Hussien Mohamed

Lecturer in Forensic Medicine and Clinical Toxicology department

Faculty of Medicine-Ain Shams University

Faculty of Medicine

Ain-Shams University

2020

Acknowledgement

*First of all, all gratitude is due to **Allah** almighty for blessing this work, until it has reached its end, as a part of **Allah** generous help, throughout my life.*

*I would like to express my very great and deep appreciation to **Prof. Dr. Sawsan Abd El-Fattah Shalaby**, professor of forensic medicine and clinical toxicology, faculty of medicine, Ain Shams University for her precious instructions, expert supervision and valuable comments during the course of this work. I really had the honor to complete this work under her supervision.*

*I do feel extremely grateful to **Prof. Dr. Eglal Hassan El Awady**, professor in forensic medicine and clinical toxicology department, faculty of medicine, Ain Shams University for her active cooperation, continuous advice, great support as well as her expert touches. I was truly honored to work under her supervision.*

*I would like to offer my special thanks to **Dr. Rania Hussien Mohamed,** Lecturer in forensic medicine and clinical toxicology department, faculty of medicine, Ain Shams University for her patience, wise support, smooth learning without boredom and her respect to the candidate. I was truly honored to work under her supervision.*

I would like to express sincere thanks to all staff members of forensic medicine and clinical toxicology department, as well as staff members of poison control center, Ain Shams University, for their great help and reinforcement.

*Finally, I wish to thank **my dear family**, parents especially my beloved mother and friends for their help and continence support through the course of this work.*

Marwa Mohamed Abdel Wahab

List of Contents

List of Abbreviations

Abb.	Full term
%	Percentage
°C	*Celsius*
8-OH-dGuo	8-hydroxydeoxyguanosine
A	Airway
ABG	Arterial blood gases
ABTS	2, 2'- azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)
ADP	Adenosine diphosphate
AF	Atrial fibrillation
AHA	American Heart Association
ALP	Aluminum phosphide
ALT	Alanine transaminase
ARDS	Adult respiratory distress syndrome
AST	Aspartate transaminase
ATP	Adenosine triphosphate
AUC	Area under curve
B	Breathing
BP	Blood pressure
C	Circulation
CAS	Chemical Abstracts Service
CI	Confidence interval
CL	Chloride ion
CK-MB	Creatine kinase myocardial band
Cm	Centimetre
CO2	Carbon dioxide
cTn I	Cardiac Troponin I
CVP	Central venous pressure
DNA	Deoxyribonucleic acid
ECMO	Extracorporeal membrane oxygenation
ECG	Electrocardiogram
ER	Emergency room
Etc	et cetera
G6PD	Glucose-6-phosphate dehydrogenase
GHS	Globally Harmonized System of classification and Labeling of Chemicals
GIT	Gastrointestinal tract

List of Abbreviations Cont...

Abb.	Full term
gm	: gram
gm/mol	: gram-molecular weight
GSH	: Glutathione
H	: Hydrogen ion
H2 receptor	: Histamine receptor type II
H_2O	: Water
HCO3	: Bicarbonate
HCL	: Hydrochloric acid
H_3P	: Hydrogen phosphide
ICU	: Intensive care unit
IGF-1	: Insulin like growth factor
IPCS	: International Programme on Chemical Safety
IQR	: Interquartile range
K	: Potassium
kg	: kilogram
K-Test	: Kruskal Wallis Test
L	: Liter
LD_{50}	: The median lethal dose
mEq	: Milliequivalent
mg/dl	: *milligrams* per deciliter
Mg3P2	: Magnesium phosphide
min	: minute
Mm	: Millimetre
mm Hg	: *millimeters* of Mercury
µmol/L	: Micromole /liter
Msec	: Millisecond
OH	: Hydroxyl radical
N	: one mole of silver nitrate
Na	: Sodium
NAC	: N-acetylcysteine
NADH	: Nicotinamide Adenine Dinucleotide Hydrogen
$NaHCO_3$	: Sodium bicarbonate
ng⁄ml	: Nanograms Per Millilitre
Nm	: Nanometer
O_2	: Oxygen

List of Abbreviations Cont...

Abb.		Full term
OD	:	Optical density
PaCO2	:	Partial pressure of carbon dioxide
PaO2	:	Partial pressure of oxygen
PCC-ASUH	:	Poison Control Center of Ain Shams University Hospitals
PH_3	:	Phosphine gas
PH_4 +	:	Phosphonium
Ppm	:	Parts per million
PSS	:	Poisoning Severity Score
PVC	:	Premature ventricular contraction
RBBB	:	Right bundle branch block
ROC	:	Receiver Operating Characteristic
ROS	:	Reactive Oxygen species
SD	:	Standard deviation
So2	:	Oxygen saturation
SOD	:	Superoxide dismutase
TAC	:	Total antioxidant capacity
TOS	:	Total oxidative status
Tnt	:	Troponin T
U test	:	Mann Whitney Test
U/L	:	Unit/liter
UK	:	United Kingdom
UV	:	Ultraviolet
V/v	:	Volume/Volume
VE	:	Vitamin E
VF	:	Ventricular fibrillation
VT	:	Ventricular tachycardia
WHO	:	World Health Organization
Zn	:	Zinc
ZnP	:	Zinc phosphide
Zn_3P_2	:	Zinc phosphide molecular formula
µg	:	Microgram

List of Tables

Table No.	Title	Page No.

List of Tables Cont...

List of Figures

List of Figures Cont...

List of Figures Cont...

Fig. No.	Title	Page No.

Introduction

Rodenticides toxicity has been a public health problem worldwide, as about 250,000 to 370,000 individuals die each year due to exposure. They are the second common cause of suicidal attempts worldwide after organophosphates responsible for about one-third of these attempts ***(Hashemi-Domeneh et al., 2016; Manouchehri et al., 2019).***

Metal phosphides are type of rodenticide that are extremely lethal with low safety and high mortality rates as high as 70–100% ***(Mehrpour et al., 2012; Etemadi-Aleagha et al., 2015).***They are also used as a common powerful suicidal tool in Egypt and developing countries due to its low price and easy availability ***(Sagah et al., 2015; Badawi et al., 2018).***

According to reports from the Poison Control Center of Ain Shams University Hospitals (PCC-ASUH), it was reported that 568 (13% of admissions) and 386 (10.2% of admissions) cases of acute metal phosphides poisoning were admitted during years of 2016 and 2017 respectively ***(Records from PCC-ASUH).***

The exact mechanism of acute phosphides toxicity has not been well defined despite the high mortality rates that are reported following significant exposures to aluminium or zinc phosphides and the treatment is still supportive including rapid decontamination and institution of resuscitative measures ***(Goharbari et al., 2018).***

Evidence of reactive oxygen species-induced toxicity owing to metal phosphides has been observed in insects