

**BIOCHEMICAL STUDIES ON WATERMELON  
RINDS AGAINST ACUTE NEPHROTOXICITY  
AND HEPATOTOXICITY**

**By**

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**B.Sc. Agric. Sci. (Agricultural Biochemistry), Fac. Agric., Cairo Univ., 2010**

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### ABSTRACT

The present study was carried out to highlight the protective effect of watermelon rind against dimethoate induced nephrotoxicity and hepatotoxicity. Proximate analysis of watermelon rinds in dry weight and some phytochemical screening and HPLC quantitative analyses of phenolic compounds, flavonoids and organic acids in water extract (WE) and ethanolic extract (EE) of watermelon rinds were determined. Amino acids were analyzed by amino acid analyzer. The results showed that moisture content, ash, crude protein, crude fat, crude fiber and total hydrosable carbohydrate were 14.80, 16.50, 15.3, 1.8, 13.60 and 38.20% respectively. Also phenolic compounds, flavonoids, tannins and vitamin C were 14.88 mg/g, 2.55 mg/g, 2.11 mg/100g and 6.65 mg/100g respectively in water extract and 13.66 mg/g, 2.34 mg/g, 1.52 mg/100g and 5.22 mg/100g respectively in ethanolic extract. Catechol, epicatechin, e-vanillic, pyrogallol and salicylic were identified by HPLC at highly levels in phenolic compounds in WE and EE. While hisperidin and narengin were the major flavonoids identified by HPLC in both extracts (WE, EE). Citric, D, L malic, acetic and propenoic acids were main organic acids detected by HPLC in WE and EE. Lysin, arginine, valine, glutamic acid, aspartic acid and proline were a much higher amino acids identified by amino acid analyzer.

The male albino rats treated with WE (2g /kg b.w.), EE (2g /kg b.w.) and WMRP5% (basal diet supplemented with 5% watermelon rinds powder). Along with administration of dimethoate (40 mg/kg b.w.) 1/10 LD<sub>50</sub> and (20 mg/kg b.w.) 1/20 LD<sub>50</sub> for 6 weeks. The obtained results showed that the treatments generally lowered the DM-induced activity of hepatic enzyme markers (AST, ALT, ALP) and total bilirubin, kidneys function parameter levels (urea, uric acid and creatinine) and lipid profiles levels (triglycerides, cholesterol, LDL-c and VLDL-c) but increased protein profile (protein, albumin and globulin) and HDL-c levels. Also, the histopathological examination showed marked improvements in histological structure of the liver, kidneys and testes. These results indicate that watermelon rinds has protective effect against dimethoate induced hepatotoxicity and nephrotoxicity. This may be attributed to the powerful antioxidants (phenolic compounds and flavonoids) which present in high levels in watermelon rinds.

**Key words:** watermelon rinds , phenolic compounds, flavonoids, dimethoate, rats, hepatotoxicity, nephrotoxicity

## DEDICATION

*I dedicate this thesis firstly to my lovely Parents, my brothers Mohamed and Ibrahim and my sisters Dina , Rahma and rabab whom support me in everything who helped me to finish my master thesis. As well as to my husband Tarek and my daughters logain and Noursen for their help and patience.*

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## **LIST OF ABBREVIATIONS**

### **Abbreviation**

<b>AChE</b>	<b>Acetylcholinesterase</b>
<b>ALP</b>	<b>Alkaline phosphatase</b>
<b>ALT</b>	<b>Alanine aminotransferase</b>
<b>AST</b>	<b>Aspartate aminotransferase</b>
<b>ATF</b>	<b>Anti tumor factor</b>
<b>ATP</b>	<b>Adenosine triphosphate</b>
<b>CCl<sub>4</sub></b>	<b>Carbon tetrachloride</b>
<b>DM</b>	<b>Dimethoate</b>
<b>DMSO</b>	<b>dimethylsulfoxide.</b>
<b>D.A.AS</b>	<b>dispensable amino acids</b>
<b>FAO</b>	<b>Food and Agriculture Organization</b>
<b>GD</b>	<b>Gestation days</b>
<b>GK</b>	<b>Glycerol kinase</b>
<b>GOD</b>	<b>Glucose oxidase</b>
<b>GPO</b>	<b>Glycerol phosphate oxidase</b>
<b>GPX</b>	<b>Glutathion peroxidase</b>
<b>GST</b>	<b>Glutathione-S-transferase</b>
<b>GR</b>	<b>Glutathione reductase</b>
<b>H and E stain</b>	<b>Heamtoxyline and eosin stain</b>
<b>H<sub>2</sub>O<sub>2</sub></b>	<b>Hydrogen peroxide</b>

**Continued.**

<b>HDL-c</b>	<b>High density lipoprotein-cholesterol</b>
<b>I.A.As</b>	<b>indispensable amino acids</b>
<b>LDH</b>	<b>Lactate-dehydrogenase</b>
<b>LDL-c</b>	<b>Low density lipoprotein cholesterol</b>
<b>LPL</b>	<b>Lipoprotein lipase</b>
<b>LPO</b>	<b>Lipid peroxidation</b>
<b>NRC</b>	<b>National Research center</b>
<b>OPI</b>	<b>Organophosphorus insecticide</b>
<b>POD</b>	<b>Peroxidase</b>
<b>ROS</b>	<b>Reactive oxygen species</b>
<b>SDS</b>	<b>Sodium dodecyl sulphate</b>
<b>SOD</b>	<b>Superoxide dismutase</b>
<b>TB</b>	<b>Total bilirubin</b>
<b>VLDL-c</b>	<b>Very low density lipoprotein- cholesterol</b>
<b>WHO</b>	<b>World Health Organization</b>



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