Faculty of Science
Biochemistry Department

Biochemical Study on the Hepatoprotective Activity of Sea Cucumber (*Holothuria*) Extract in Rats

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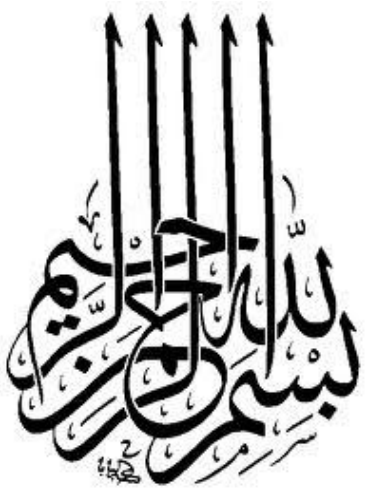

﴿قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ﴾

صدق الله العظيم

سورة البقره الأيه (٣٢)

Faculty of Science
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Declaration

This thesis has not been submitted for a degree at this or any other university

Elham Abd El-Badiea Mahmoud

Dedication

I would like to dedicate this thesis to whom I am greatly indebted.

…….To my father's spirit

…….To my mother

(The merciful, supportive and beloved persons in my life).

……To every member in my family for his endless love, support and concern.

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ABSTRACT

In the present study, high performance liquid chromatography analysis of aqueous and mixed extracts of sea cucumber (*Holothuria atra*) body wall revealed the presence of some active phenolic compounds at variable concentrations (chlorogenic acid, pyrogallol, rutin, catechin, cinnamic acid, ellagic acid, and coumaric acid), as well as vitamin C. The mixed extract has demonstrated higher antioxidant and iron chelating activities, as well as inhibition of lipid peroxidation than the aqueous one in a cell-free system. The hepatoprotective activity of the sea cucumber mixed extract was furtherly evaluated against thioacetamide-induced liver fibrosis in rats. Subchronic oral administration of sea cucumber mixed extract (14.40 mg/Kg b.w.) to normal rats thrice weekly for 8 consecutive weeks did not show any toxic side effects on the central nervous system, heart beat rate, or depth of respiration of the host, whereas enhanced hepatic superoxide dismutase and glutathione peroxidase activities. Co-administration of sea cucumber extract and thioacetamide (protection modality) normalized serum direct bilirubin, alanine

and aspartate aminotransferases activities, as well as hepatic malondialdehyde, reduced glutathione, hydroxyproline concentrations and antioxidant enzyme activities. Histological examination of hematoxylin and eosin-stained liver sections of the protective group showed a substantial attenuation in the degenerative changes induced by thioacetamide intoxication. In conclusion, the sea cucumber mixed extract has shown a significant hepatoprotective activity against TAA intoxication, which might be due to its content of active phenolic compounds.

***Key words**: Holothuria atra, HPLC analysis, In vitro antioxidant studies, Thioacetamide, Biochemical studies, Histological studies, Rats.*

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II. *In Vitro* Antioxidant Studies

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A) Blood Analysis

List of Abbreviations

AOS	Activated oxygen species
ATP	Adenosine triphosphate
ALT	Alanine Aminotransferase
A/G	Albumin/globulin
ALP	Alkaline Phosphatase
AFC	Antibody-forming cell
ARE	Antioxidant response element
AST	Aspartate Aminotransferase
BHA	Butylated hydroxyanisole
CAT	Catalase
CCL21	C-C chemokine ligand 21
CK	Creatine kinase
CYP	Cytochrome P450
DBD	DNA-binding domain
DHBS	3,5-Dichloro-2-hydroxybenzenesulfonic acid
DTNB	5, 5'-Dithiobis-2-nitrobenzoic acid
DPPH	α, ᾱ -Diphenyl-β-picrylhydrazyl radical
DHA	Docosahexaenoic acid
EPA	Eicosapentaenoic acid
EGFR	Epithelial growth factor receptor

EGF	Epidermal growth factor
ECM	Extracellular matrix
FGFR	Fibroblast growth factor receptor-1
FMO	Flavin-containing monooxygenase
FFA	Free fatty acids
FucCS	Fucosylated chondroitin sulphates
GAGs	Glycosaminoglycans
GST	Glutathione *S*-transferase
GR	Glutathione reductase
GCS	γ-glutamylcysteine synthetase
GS	GSH synthetase
GGT	γ-Glutamyl transferase
HCV	Hepatitis C virus
HSC	Hepatic stellate cell
HGF	Hepatocyte growth factor
HPLC	High-performance liquid chromatography
4-HDA	4-Hydroxyalkenals
8-OHdG	8-Hydroxy-2'-deoxyguanosine
IGF	Insulin-like growth factor
IFN	Interferon
IL	Interleukin
LDH	Lactate dehydrogenase
LOX	Lipoxygenase