بسم الله الرحمن الرحيم

∞∞∞

تم رفع هذه الرسالة بواسطة / مني مغربي أحمد

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

EFFECT OF NANO-SELENIUM AND MOLECULAR HYDROGEN ON BIOLOGICAL SYSTEM UNDER OXIDATIVE STRESS

By

FATMA SHAWKY FAYEZ MOHAMED
B.Sc. Agric. Sc. (Agric. Biochemistry), Fac. of Agric. Ain Shams University, 2013

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Degree of

MASTER OF SCIENCE
in
Agricultural Sciences
(Agricultural Biochemistry)

Department of Agricultural Biochemistry
Faculty of Agriculture
Ain Shams University

2022

Approval Sheet

EFFECT OF NANO-SELENIUM AND MOLECULAR HYDROGEN ON BIOLOGICAL SYSTEM UNDER OXIDATIVE STRESS

By

FATMA SHAWKY FAYEZ MOHAMED
B.Sc. Agric. Sc. (Agric. Biochemistry), Fac. of Agric. Ain Shams University, 2013

This thesis for M. Sc. degree has been approved by:

Dr. Mahmoud Abd El-Razek Doheim …….
Prof. Emeritus of Biochemistry, Faculty of Agriculture, Zagazig University.

Dr. Salwa Ahmed Eid …….
Prof. Emeritus of Biochemistry, Faculty of Agriculture, Ain Shams University.

Dr. Hany Abd El-Khalek Sharaf El-Deen …….
Prof. Emeritus of Biochemistry, Faculty of Agriculture, Ain Shams University.

Dr. Safwat Hassan Ali …….
Prof. Emeritus of Biochemistry, Faculty of Agriculture, Ain Shams University.

Date of Examination: / / 2022

EFFECT OF NANO-SELENIUM AND MOLECULAR HYDROGEN ON BIOLOGICAL SYSTEM UNDER OXIDATIVE STRESS

By

FATMA SHAWKY FAYEZ MOHAMED

B.Sc. Agric. Sc. (Agric. Biochemistry), Fac. of Agric. Ain Shams University, 2013

Under the supervision of:

Dr. Safwat Hassan Ali

Prof. Emeritus of Biochemistry, Department of Agricultural Biochemistry, Faculty of Agriculture, Ain Shams University (Principal Supervisor).

Dr. Hany Abd El-Khalek Sharaf El-Deen

Prof. Emeritus of Biochemistry, Department of Agricultural Biochemistry, Faculty of Agriculture, Ain Shams University.

Dr. Mohamed Sayed Heikal

Associate Prof. of Biochemistry, Department of Agricultural Biochemistry, Faculty of Agriculture, Ain Shams University.

ABSTRACT

Fatma Shawky Fayez Mohamed: Effect of Nano selenium and molecular hydrogen on biological system under oxidative stress. Unpublished M.Sc. Thesis, Department of Agricultural Biochemistry, Faculty of Agriculture, Ain Shams University, 2022.

The conducted study was aimed to evaluate effect of selenium nanoparticles (SeNPs) and molecular hydrogen on biological system exposed to disturbing the prooxidant/antioxidant balance of cells, using two oxidative stress, Thioacetamide (TAA) as a chemical oxidative stress agent and ultraviolet UV ray specially (UVA) as a physical oxidative stress agent. Thus, the study tends to investigate the protective efficacy such as effect of nano selenium and molecular hydrogen treatments against oxidative stress imbalance induced by thioacetamide (TAA) and ultraviolet (UVA) in male albino rats through the estimation of various oxidative stress biomarkers *i.e.* lipid peroxidation, antioxidant enzymes. Therefore, to accomplish this target 96 experimental albino rats were selected and divided into 16 groups (6 rats/group) as follows: Group 1: Normal control (NC), only orally treated with 0.9% saline solution, group 2: orally treated with Selenium Nanoparticles (SeNPs) (0.3 mg/Kg body weight), group 3: orally treated with molecular hydrogen in drinking water as hydrogen rich water (HRW) (6.75 mg/Kg body weight), group 4: orally treated with (SeNPs + HRW), group 5: Thioacetamide (TAA), intraperitoneally treated with (100 mg/Kg body weight) group 6: i.p. & orally treated with (TAA and SeNPs), group 7: i.p. & orally treated with (TAA and HRW), group 8: treated i.p. with TAA and orally received (SeNPs and HRW), group 9: rats were exposed to UV radiation dose, group 10: rats exposed to UV radiation and orally received SeNPs, group 11: rats exposed to UV radiation and orally received HRW, group 12: rats exposed to UV radiation and orally received (SeNPs and HRW), group 13: i.p. injected with TAA and rats exposed to UV radiation, group 14: i.p. injected with TAA, rats exposed to UV radiation and orally received SeNPs, group 15: i.p. injected with TAA, rats exposed

to UV radiation and orally received HRW, group 16: i.p. injected with TAA, rats exposed to UV radiation and orally received (SeNPs and HRW).

The experiment of TAA was continued for three months followed by one month recovery. However, the UV experiment still three months without recovery study. During experimental duration, blood samples were taken every month for analysis. The obtained results indicated that TAA & UV cause significant alterations in biochemical parameters. Besides, TAA & UV induces hepatic fibrosis and histological manner of liver and elevated serum aminotransferases levels, increased malondialdehyde (MDA) as biomarker of lipid damage and decrease antioxidant enzymes activity. Meanwhile administration of Nano-Selenium and molecular hydrogen improve liver enzymes and reduce the oxidative stress. Obviously, TAA & UV significantly decreases levels of superoxide dismutase (SOD), glutathione reductase (GR), catalase (CAT) and reduced glutathione content (GSH). In addition, data obtained reveal that SeNPs & Molecular hydrogen or (HRW) significantly reduce the hazard effects of TAA & UV in male albino rats. It could be concluded that Nano-Selenium has a powerful hepato-protective and antioxidant effects. In addition, Nano-Selenium and molecular hydrogen play as antagonistic agents against chemical & physical oxidative stress induced by thioacetamide toxicity and hazard effect of UV radiation respectively.

Keywords: Thioacetamide, Nano-selenium, chemical & physical Oxidative stress, antioxidant enzymes, UVA radiation and molecular hydrogen or (HRW).

ACKNOWLEDGEMENT

I am deeply grateful to my supervisors for their support and guidance during this study. I would like to express my deepest gratitude to **Prof. Dr. Safwat Hssan Ali,** Prof. Emeritus of Biochemistry, Faculty of Agriculture, Ain shams University for supervision, valuable advice, constructive suggestions and continuous encouragement, words are not enough to express how grateful I am to his dedicated guidance, assistance in preparation and revision of the manuscript, and encouragement throughout this study.

Gratefulness and thanks to express my deep gratitude and sincere appreciation to **Prof. Dr. Hany Abd El-Khalek Sharaf El-Deen,** Prof. Emeritus of Biochemistry, Faculty of Agriculture, Ain shams University**,** for valuable guidance during the course of this investigation and helping during every step of thesis.

Also, I wish to express my deepest gratitude to **Dr. Mohamed Sayed Heikal,** Associate Prof. of Biochemistry, Faculty of Agriculture, Ain shams University**,** for his unlimited help and cooperation throughout the whole work and preparing this manuscript.

In addition, I am grateful to **Dr. Mohamed Abdelhady Omar,** Lecturer of Biochemistry, Faculty of Agriculture, Ain Shams University for his suggestion for molecular hydrogen idea and helping in the practical part through supply with UVA lamps, valuable advice, and guidance throughout this study. Also, I wish to express my thanks to **Prof. Dr. Hani Saudy,** Agronomy Dept. Faculty of Agriculture, Ain Shams University **Prof. Dr. Mrwan Abdelaziz,** Poultry Production Dept. Faculty of Agriculture, Ain Shams University, and **Dr. Mostafa G. Shahin,** Lecturer of Agronomy Faculty of Agriculture. Ain Shams University.

Great thanks for my colleagues and all the staff members of Agricultural Biochemistry Department Faculty of Agriculture, Ain Shams

University for their generosity, encouragement and help during the preparation of this work.

Lastly but not least, I want to express my sincere appreciation and heartily thanks to my family for their continuous patience, support, great help and encouragement throughout this work.

CONTENTS

LIST OF TABLES