The Use of Some Plant Extracts to Reduce Acrylamide Toxicity in Some Foods

By

Ebraheem Mohamed Ebraheem Abo Lila

B.Sc. Agricultural science, Ain shams University, 2003
Diploma in Environmental Science (Agricultural Science Department),
Institute of Environmental Studies and Research, Ain Shams University, 2006

A Thesis Submitted in Partial Fulfillment

Of

The Requirements of the master degree

In

Environmental Science

(Department of Agricultural Science)
Institute of Environmental Studies and Research,
Ain Shams University

2013

APPROVAL SHEET

The Use of Some Plant Extracts to Reduce Acrylamide Toxicity in Some Foods

By

Ebraheem Mohamed Ebraheem Abo Lila

B.Sc. Agriculture, Ain shams University, 2003

Diploma in Environmental Science (Agricultural Science Department),
Institute of Environmental Studies and Research, Ain Shams University, 2006

This thesis towards a Master Degree in Environmental Science has been approved by:

1- Prof.Dr. Helmy Taha Omran
Professor of Food Technology, Food Technology Dep., Faculty of Agriculture, Suez Canal University (Ismailia)

2- Prof. Dr. Farouk Guindi Moawad
Professor of Biochemistry, Biochemistry Dep., Faculty of Agriculture, Ain Shams University.

3- Prof.Dr. Usama Mohamed Radwan
Professor of Food Technology and head of the Environmental Agricultural Sciences Dep., Institute of Environmental Studies and Research, Ain shams University.

4- Prof.Dr. Mohamed Abdel Razek EL-Nawaw
Professor of Microbiology, Food Science Dep., Faculty of Agriculture Ain shams University.

Date of Examination 30/12/2012

The Use of Some Plant Extracts to Reduce Acrylamide Toxicity in Some Foods

By

Ebraheem Mohamed Ebraheem Abo Lila
B.Sc. Agricultural science, Ain shams University, 2003
Diploma in Environmental Science (Agricultural Science Department), Institute of Environmental Studies and Research, Ain Shams University, 2006

A thesis submitted in partial fulfillment

Of

The requirement of the master degree

In

Environmental Science

(Department of Agricultural Science)

Under the Supervision of:

1- Prof.Dr. Mohamed Abdel Razek EL-Nawaw
Professor of Microbiology, Food Science Dep., Faculty of Agriculture Ain shams University.

2- Prof.Dr. Usama Mohamed Radwan
Professor of Food Technology and head of the Environmental Agricultural Sciences Dep., Institute of Environmental Studies and Research, Ain shams University.

3- Dr. Mahgoub Mohamed Ahmed
Associate Professor of Biochemistry, Molecular Drug Evaluation Dep., National Organization for Drug Control and Research.

Acknowledgements

First I am deeply thankful to **Allah**, the most beneficent and merciful.

I wish to express my deepest gratitude, everlasting appreciation and sincere appreciation to **Dr. Mohamed Abdul Razek EL-Nawawy,** Professor of Biotechnology, Food Science Dep., Faculty of Agriculture, Ain shams University, for his supervision, valuable assistance, useful advice, guidance and his unlimited helps in writing this thesis.

I wish to express my hearty appreciation and sincere gratitude to **Dr. Usama Mohamed Radwan,** Professor of Agricultural science, Institute of Environmental Studies and Research, Ain shams University, for suggestion this research work planning, his supervision, help and advice in writing the thesis and encouragement.

Special thanks to **Dr. Mahgoub M. Ahmed,** Associate Professor of Biochemistry, Molecular Drug Evaluation Dep., National Organization for Drug Control and Research, for his help in the analysis part of this study, help and advice in writing the thesis.

ABSTRACT

Ebraheem Mohamed Ebraheem Abo Lila

The Use of Some Plant Extracts to Reduce Acrylamide Toxicity in Some Foods

Institute of Environmental Studies and Research, Ain Shams University,

The present study investigated the acrylamide content in some Egyptian food staffs, (Chips, Batte, Roast coffee) as well as the protective effect of garlic, thyme and allspice on acrylamide content. Acrylamide content in final product were quantified by HPLC. The results showed chips contained the highest content of acrylamide in low economy areas, whereas batte had the highest acrylamide content in high economy areas. In addition, allspice had the highest protective effect on acrylamide content in home made crisps. These results indicate that allspice has promising protective effect on acrylamide content in food staff as a result of its reducing action on acrylamide in home made crisps and the protective effect of allspice *(Pimenta dioica*, L.) aqueous extract on acrylamide (AA) toxicity was evaluated in rats. The rats were feeding crisp potatoes soaked in 20, 40 or 80 ppm of acrylamide with 100 ppm of allspice aqueous extract; others were feeding the same Acrylamide concentrations only. The results revealed that alanine aminotransferase (AST), aspartate aminotransferase (ALT), Total protein (T.P) and acetyl cholinesterase (AChE) of serum and glutathione (GSH) in liver and brain were decreased in rats-treated with acrylamide, while, superoxide dismutase (SOD), glutathione-S-transferase (GST), lipid peroxidation (LPO) in serum, liver and brain were increased. This effect of Acrylamide was attenuated by allspice extract. In liver, the

histopathological changes were elevated by increasing the concentration of acrylamide, appeared as dilated, congestion of blood vessels, dilated and congestion of sinusoids, vacuolation, necrosis areas of hepatocytes, inflammatory cells infiltration in hepatocytes and in portal vein and dissociation of the hepatic cords. In brain frontal cortex most of the pyramidal cells appeared with faintly stained nuclei, darkly stained nuclei and or surrounded by halos with loss of dendrites and vacuolated neuropil, while allspice aqueous extract ameliorates low dose of acrylamide histopathological alternations.

Fig.27: Photomicrograph of testis tissue section obtained from 80ppm acrylamide showing more changes than group (4, 5 and 6). Seminiferous tubules with irregular shapes (arrow), separated from each others, some have germ cells detached from the basement membrane, (H&E, X: 200)	72