ASSESSING THE ROLE OF NATURAL ANTIOXIDANTS IN SOME FOODS AND BEVERAGES AS PROTECTIVE AGENTS AGAINST POLLUTION EFFECT OF SOME CHLORINATED SOLVENTS

By
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B.Sc. Home Economics (Nutrition and Food sciences), Helwan University, 1981
Master in Home Economics (Nutrition and Food sciences), Helwan University, 1992

A Thesis Submitted in Partial Fulfillment the Requirement for Doctor of Philosophy
in
Environmental Sciences

Department of Environmental Basic Sciences
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APPROVAL SHEET

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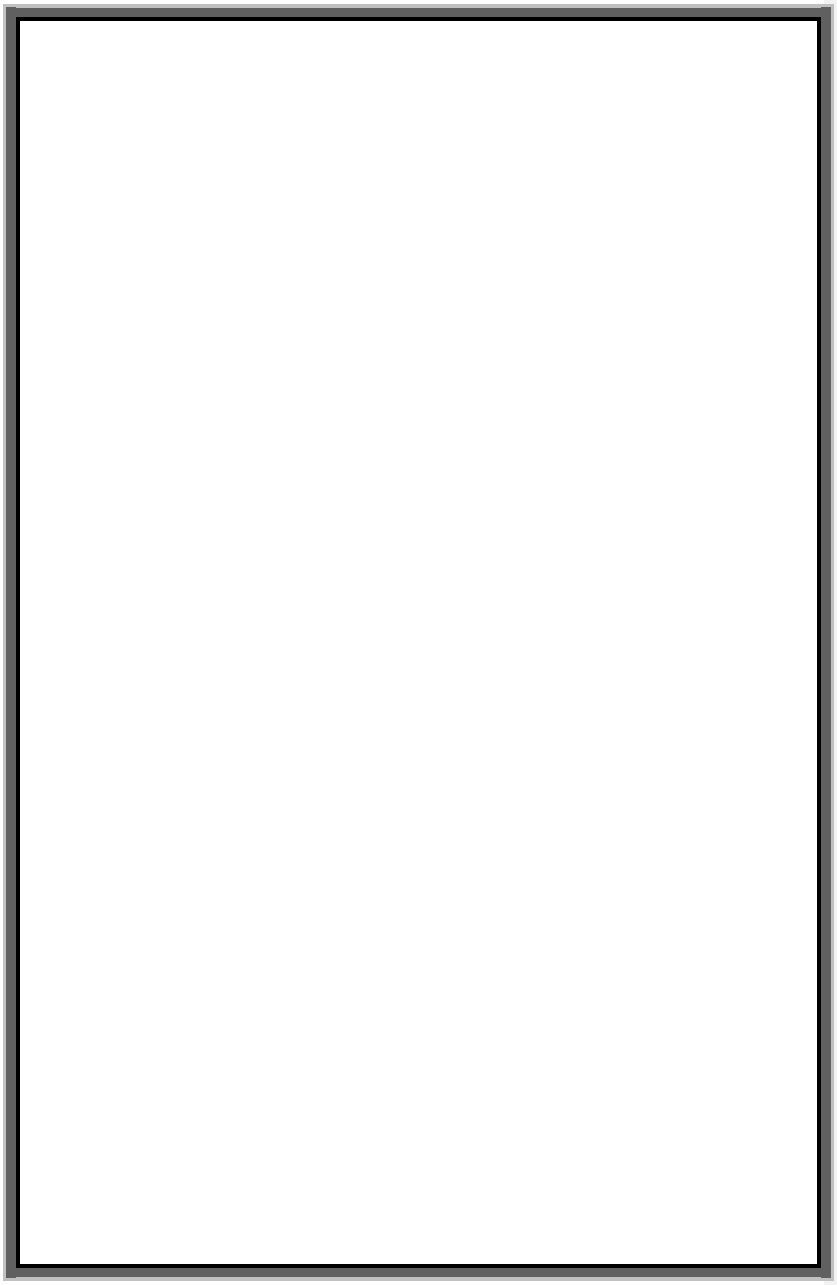

LIST of ABBREVIATION:

ADP	adenosine – 5- diphosphate
AGE	Aged garlic extract
ALT	alanine aminotransferase
AP	aminoantipyrine
AST	aspartate aminotransferase
ATP	adenosine- 5- triphosphate
B.W.	Body weight
PCBs	Polychlorinated biphenyls
BUN	Blood Urea nitrogen
CA	Caffeic acid
CCl_3	Trichloromethyl
$CCl_3OO^{\cdot}$	Trichloromethyl peroxyl radicals
CCl_4	Carbon tetrachloride
CE	Cholesterol esterase
CFCs	Chlorofluorocarbons
CO_2	Carbon dioxide
CPK	Creatinine phosphokinase
Cr	Creatinine
CRF	Chronic renal failure
CYP2B1	Cytochrome P2B1
CYP2E1	Cytochrome P2E1
DCE	1,2 dichloroethane
DFO	desferrioxamine
DNA	Deoxyribonucleic acid
DTNB	dithiobis – nitro benzoic acid
EGCg	epigallocatechin 3-O- gallate
EDTA	Ethylene diamine tetra acetic acid
G-3-P	glycerol -3 – phosphate
GGT	gamma- glutamyl transferase
GK	glycerol Kinas
GM	gentamicin
GR	glutathione reductase
GSH	Glutathione

GWP	Global warming potential
Hb	Hemoglobin
Hct	Hematocrit
HDL- cholesterol	High density lipoprotein
HMG-CoA	reductase 3-hydroxy -3- methyl glutary coenzyme A reductase of liver microsomal
i.p.	intraperitoneal
LCF	Lipid clearing factor
LDL cholesterol	Low density lipoprotein
LPS	Lipopolysacharid
LSD	Least significant difference
MCHC	mean corpuscular hemoglobin concentration
MCV	mean corpuscular volume
MDA	malondialdehyde
NAD	nicotinamide adenine dinucleotide
NADPH	reduced nicotinamide adenine dinucleotide
PCA	Perchloric acid
POD	peroxidase
RBC	Red blood cell
RNA	Ribonucleic acid
ROIs	reactive oxygen intermediates
ROS	reactive oxygen species
Se	Selenium
SOD	superoxide dismutase
t- BHP	tert- butylhydropreoxide
TAS	Total antioxidants status
TBA	Thiobarbituric acid
TBARs	Thiobarbituric acid reactants
TEAM	Total Exposure Assessment Methodology
TG	Triglycerides
TNF- α	Tumor necrosis factor- α
TQ	Thymoquinone
TSSA	Total superoxide scavenger activity
USFA	Unsaturated fatty acid

ABSTRACT

Assessing the Role of Natural Antioxidants in Some Foods and Beverages as Protective Agents against Pollution Effect of Some Chlorinated Solvents.

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One hundred and fourteen adult male albino rats are divided into 19 groups. Group (A) (Normal or negative control) fed standard diet without addition of either chlorinated solvents (CCL_4; DCE) or natural antioxidants (artichoke, cynarin, coffee and caffeic acid). Group (B) "positive control CCL_4" fed standard diet + (CCL_4) Carbon tetrachloride. Group (C) "positive control DCE" fed standard diet + (DCE) 1,2-dichloroethane.

The preventive groups are (D; E; F; G; H; I; J & K) fed experimental diet containing natural antioxidants (cynarin, artichoke, caffeic acid and coffee respectively) for whole period "6" weeks while chlorinated solvents (CCL_4or DCE) is added after "2" weeks from starting of experiment.

The protective groups are (L; M; N; O; P; Q; R & S) fed standard diet with both antioxidant and pollutant for the whole period of experiment (6 weeks).

All albino rats are sacrificed and blood sample collected from hepatic portal vein, organs are removed and then subjected to biochemical analysis and histopathological examination.

Chlorinated solvents have a direct toxic on liver and kidney, this effect is clear in this study by the presence

of cell necrosis in liver and tubular necrosis in the kidney.
Depending on biochemical results, the best antioxidant in the preventive groups in hematology prevention was Artichoke (group F); in the enzymes of liver prevention was cynarin (group D) and artichoke (groups F & G). In Kidney functions prevention was all antioxidant, in brain prevention was caffeic acid (group I) and artichoke (groups F&G).

Protective groups in hematology protection was artichoke (group N), in the enzymes of liver protection was coffee (group S); artichoke (group O) and cynarin (group M). In Kidney functions protection was coffee (group R) and caffeic acid (group Q). In brain protection was caffeic acid (group Q); cynarin (groups L & M).

Depending on pathological in liver protection the best was cynarin (group E); artichoke (group G) and caffeic acid (group I). In kidney, protection was cynarin (group D); artichoke (group G) and caffeic acid (group I).

Key wards: Pollution – Chlorinated solvents- Free radicals- Antioxidants- Phenolic compounds

Aim of Study

The study aims to:

1- investigate the effect of natural antioxidants present in some foods "Artichoke; Cynarin" and beverages "Coffee; Caffeic acid" against chlorinated solvents [1,2-dichloroethane "DCE" and carbon tetrachloride "CCl_4" pollution] on some biological parameters e.g." Food intake - Body weight gain - Feed efficiency ratio ".

2- Study the effect of these natural antioxidants against DCE and CCl_4 on changes of biochemical aspects of blood and histopathological changes of organs.

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