شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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Effect of Ginger Nanoparticles on Hepatotoxicity and Nephrotoxicity Induced by Carbon Tetrachloride in Rats

Thesis

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قَالَ تَعَالَىٰ: ﴿وَقُلِ ٱعۡمَلُواْ فَسَيَرَى ٱللَّهُ عَمَلَكُمۡ
وَرَسُولُهُۥ وَٱلۡمُؤۡمِنُونَۖ وَسَتُرَدُّونَ إِلَىٰ عَٰلِمِ ٱلۡغَيۡبِ
وَٱلشَّهَٰدَةِ فَيُنَبِّئُكُم بِمَا كُنتُمۡ تَعۡمَلُونَ ١٠٥﴾

التوبة: ١٠٥

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This work is dedicated for the soul of my grandfather, may God bless his soul.

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Abstract

Effect of Ginger Nanoparticles on Hepatotoxicity and Nephrotoxicity Induced by Carbon Tetrachloride in Rats. Sanaa Yasser Abd-Elrhman, Master degree, Biochemistry and Nutrition Department, Faculty of Women for Arts, Science and Education, Ain Shams University.

Ginger is a well-known to possess antioxidant and anti-inflammatory properties, also it is confirmed that the milling of ginger to nanoscale improves its active compounds solubility and bioavailability, so that this study aimed to investigate the effect of ginger (G), ginger nanoparticles (GNPs), ginger nanobase (GNB) and silymarin (SM) on hepato-renal toxicity induced by carbon tetrachloride (CCl_4) in rats. Fifty-four adult male albino rats were divided into 6 groups with 9 rats in each. Group (1): (Normal control) rats were received distilled water daily orally and injected intraperitoneally (i.p.) with a single dose of corn oil (1 ml/kg B.W) at the end of the 4^{th} week of the experiment. Group (2): Rats were received distilled water daily orally and injected with a single dose of CCl_4 diluted with corn oil (1:1) (1 ml/kg B.W i.p.) at the end of the 4^{th} week of the experiment. Groups (3), (4) and (5): Rats were received orally 50 mg /kg B.W/day of G, GNPs and GNB, respectively for 8 weeks and injected with CCl_4 as group 2. Group (6): Rats were received 100 mg /kg B.W /day of SM orally for 8 weeks and injected with CCl_4 as group 2. Our results indicated that CCl_4 caused a significant increase in serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) enzymes activities and serum creatinine, urea, uric acid and cystatin-C (Cys-C) levels. Also, increasing of serum tumor necrosis factor- alpha (TNF- α), interleukin-1beta (IL-1β) , malondialdehyde (MDA) and nitric oxide (NO) levels, while serum total antioxidant capacity (TAC) level, hepatic catalase (CAT) and superoxide dismutase (SOD) enzymes activities showed a significant decrease as compared to healthy group. Also some histopathological changes in liver and kidney tissues were observed.

Oral administration of G, GNPs, GNB and SM caused an amelioration of liver and kidney functions, inflammatory markers and the oxidant - antioxidant status with an improvement in liver and kidney tissues. In conclusion, our data proved that using ginger in the form of GNPs and GNB is more efficient in ameliorating hepato-renal toxicity induced by CCl_4 than using native ginger. These results were confirmed by the results of histopathological examination of liver and kidney tissues in different rats groups.

List of Abbreviations

4- AP	4- Aminophenazone
5- LOX	5-Lipoxygenase
α-SMA	Alpha smooth muscle actin
A_{sample} or $A_{standard}$	Absorbance of sample or standard
ABC	Avidin-biotin-peroxidase complex
$AlCl_3$	Aluminum trichloride
ALP	Alkaline phosphatase
ALT	Alanine aminotransferase
AP-1	Activator protein-1
Apaf-1	Apoptotic protease activating factor -1
APCs	Antigen presenting cells
ATP	Adenosine triphosphate
AST	Aspartate aminotransferase
BD	Bile duct
BUN	Blood urea nitrogen
B.W	Body weight
CAT	Catalase
$CCl_3^{\bullet}$	Trichloromethyl radical
$CCl_3O_2^{\bullet}$	Peroxy trichloromethyl radical
CCl_4	Carbon tetrachloride

COX-2	Cyclo-oxygenase-2
CV	Central vein
CYP2E1	Cytochrome P4502E1
Cys-C	Cystatin C
DCPS	2-4 Dichlorophenol sulfonate
DHBS	3, 5-Dichloro -2- hydroxybenzene sulfonic acid
DLS	Dynamic light scattering
DNA	Deoxyribonucleic acid
DSS	Dextran sulphate sodium
eNOS	Endothelial nitric oxide synthase
EDTA	Ethylenediamine tetra acetic acid
ELISA	Enzyme-linked immune-sorbent assay
FER	Feed efficiency ratio
FIAU	2'-deoxy-2'-fluoroarabinosyl derivatives of 5-iodouracil
G	Ginger powder
GAE	Gallic acid equivalent
GDNPs	Nanoparticles derived from edible ginger or ginger derived nanoparticles
GFR	Glomerular filtration rate
GGT	ϒ-Glutamyl transferase
GNB	Basic ginger nanoparticles or ginger nanobase
GNPs	*Zingiber officinale* nanoparticles or ginger nanoparticles
GSH	Reduced glutathione

H_2O_2	Hydrogen peroxide
HA	Hepatic artery
H and E	Hematoxylin & Eosin
HDL	High density lipoprotein-cholesterol
HPLC	High performance liquid chromatography
HRP	Horse-radish peroxidase
HSC or Ito	Hepatic stellate cells or Quiescent stellate cells
iNOS	Inducible NO synthase
i.p	Interperitonealy
ICAM-1	Intracellular cell adhesion molecules -1
IL-1β	Interleukin-1β
IL-1	Interleukin-1
IL-2	Interleukin-2
IL-6	Interleukin-6
IL-8	Interleukin-8
KC	Kupffer cells
KLF6	Kruppel-like factor-6
LDL	Low density lipoprotein- cholesterol
LPS	Lipopolysaccharide
LSD	least significant difference
MAPK	p38 mitogen-activated protein kinase
MDA	Malondialdehyde
Mir or miRNA	micro-ribonucleic acid

MPT	Mitochondrial permeability transition
MMP-9	Matrix metalloproteinase- 9
m-RNA	messenger-ribonucleic acid
Na_2CO_3	Sodium carbonate
NaCl	Sodium chloride
NaClO	Sodium hypochlorite
NaOH	Sodium hydroxide
NADH	Reduced nicotinamide adenine dinucleotide
$NADP^+$	Nicotinamide adenine dinucleotide phosphate
NADPH	Reduced nicotinamide adenine dinucleotide phosphate
NE	Nanoemulsion
NF-κB	Nuclear factor kappa light chain enhancer of activated B cells or nuclear factor kappa - B
NI	Nanoinosomes
NK	Natural killer cells
NKT	Natural killer T cells
NL	Nanoliposomes
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOS	Nitric oxide synthase
NOx	Total nitrate/nitrite
NPs	Nanoparticles
Nrf2	Nuclear factor E2-related factor2
NSAIDs	Non-steroidal anti-inflammatory drugs

$O_2^{\bullet}$	Super oxide anion
O.D.	Optical density
$ONOO_2$	Peroxynitrite
PBS	Phosphate buffer saline
PD	Parkinson's disease
PECAM-1	Platelet endothelial cell adhesion molecules -1
PGE2	Prostaglandin E2
PLGA	Poly lactic co glycolic acid
PMA	Phorbol 12-myristate 13-acetate
POD	Peroxidase
PV	Portal vein
QE	Quercetin equivalent
SAA	Serum amyloid A
SABC	HRP (horse-radish peroxidase) -streptavidin conjugate
S.Cr	Serum creatinine
SE	Standard error
SLNs	Solid lipid nanoparticles
SM	Silymarin
SMs	[6]-Shogoal loaded micelles of polyethylene glycol and linoleic acid Conjugates
SOD	Superoxide dismutase
SPSS	Statistical Package for Social Science program
SSLNs	[6]- Shogaol-loaded solid lipid nanoparticles
rpm	Round per minute

rRNA	Ribosomal RNA
RNS	Reactive nitrogen species
ROS	Reactive oxygen species
TAC	Total antioxidant capacity
TAGs	Triacylglycerols
TCDD	Tetracholorodibenzo-p-dioxin
TIMP-1	Tissue inhibitor metalloproteinase proteins-1
TNFR-1	Tumor necrosis factor receptor-1
TNF-α	Tumor necrosis factor- alpha
TMB	3,3',5,5'-tetramethylbenzidine
uPA	Urokinase-type plasminogen activator
VCAM-1	Vascular cell adhesion molecule-1
VEGF	Vascular endothelial growth factor
VLDL	Very low density lipoprotein- cholesterol
WR	working reagent
XO	Xanthine oxidase

List of Content