



Possible Protective Effects of Amla (*Emblica officinalis*) on Gamma-Irradiated Male Albino Rats

A Thesis Submitted in Partial Fulfillment of the
Requirement for the Degree of M.Sc. in Zoology

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ
وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ
عَظِيمًا﴾

صدق الله العظيم
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Dedication

Special thanks to my family. Words cannot express how grateful I am to my father for all his sacrifices and prayers for me that sustained me thus far.

I would also like to thank my husband, brother and sisters who supported and encouraged me to strive towards my goal.

*This work is dedicated to
My mother*

May she rest in peace.

Declaration

I declare that this thesis has been composed by myself and the work of which is a record that has been done by myself. This thesis has not been submitted for a degree at this or any other university.

Amal Kamal Omar Mohamed

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LIST OF ABBREVIATIONS

AMPK	Activated mitogen protein kinase
ADP	Adenosine diphosphate
ATP	Adenosine triphosphate
ACTH	Adenocorticotrophic hormone
AOPP	Advanced oxidation protein product
ANOVA	Analysis of variance
Ang I	Angiotensin I
Ang II	Angiotensin II
ACE	Angiotensin-converting enzyme
AT	Angiotensin receptor
AVP	Arginine vasopressin
ANP	Atrial natriuretic peptide
AI	Atherogenic index
Apf-1	ATP-dependent proteolysis factor 1
BUN	Blood urea nitrogen
b.wt.	Body weight
BNP	Brain natriuretic peptide
Ca ²⁺	Calcium ions
CCL ₄	Carbon tetra-chloride
CVD	Cardiovascular disease
CAT	Catalase
CNS	Central nervous system
⁶⁰ Co	Cobalt -60
cDNA	complementary DNA
CPK	Creatine phosphokinase
CNP	C-type natriuretic peptide
cAMP	Cyclic adenosine monophosphate
Cys-SoH	Cysteine sulfenic form
Cys-SH	Cysteine thiol
Cys-S-	Cysteine thiolate

DOCA	Deoxycorticosterone acetate
DNA	Deoxyribonucleic acid
DTNB	5, 5' dithiobis-2-nitrobenzoic acid
ECGS	Echocardiograms
EDTA	Ethylene diamine tetraacetic acid
EO	<i>Emblica officinalis</i>
ET-1	Endothelin-1
ELISA	Enzyme-linked-immunosorbent assay
Fe ²⁺	Ferrous ion
GGT	Gamma-glutamyl transferase
GFR	Glomerular filtration rate
G6PDH	Glucose 6-phosphate dehydrogenase
Grx	Glutaredoxin
GSH	Glutathione
GSSG	Glutathione disulfite
GP _x	Glutathione peroxidase
HbA1c	Glycated hemoglobin
Gy	Gray
HCH	Hexachlorocyclohexane
HDL-Ch	High density lipoprotein-cholesterol
H ₂ O ₂	Hydrogen peroxide
OH-	Hydroxyl radical
HNE	4-hydroxynonenal
HMG-CoA	Hydroxymethylglutaryl Coenzyme A
IR	Ionizing radiation
iNOS	Inducible nitric oxide synthase
IDE	Insulin degrading enzyme
JG	Juxta-glomerular
LDH	Lactate dehydrogenase
LSD	Least significant difference
LCAT	Lecithin-cholesterol acyl transferase
LC3	Light chain 3

LPO	Lipid peroxidation
LDL-Ch	Low density lipoprotein-cholesterol
MDA	Malondialdehyde
mtDNA	Mitochondrial DNA
MAPK	Mitogen-activated protein kinase
Mn-SOD	Manganese-superoxide dismutase
NPs	Natriuretic peptides
NPR	Natriuretic peptide receptor
NEP	Neural endopeptidase
NAD ⁺	Nicotinamide adenine dinucleotide
NADPH	Nicotinamide adenine dinucleotide phosphate
NCRRT	National Center for Radiation Research and Technology
NO	Nitric oxide
Nrf2	Nuclear factor E2-related factor 2
PRx	Peroxiredoxins
PUFAs	Polyunsaturated fatty acids
K ⁺	Potassium ion
PGE ₂	Prostaglandin E ₂
PGI ₂	Prostaglandin I ₂
ROS	Reactive oxygen species
RT-PCR	Real-time polymerase chain reaction
RAAS	Renin-angiotensin-aldosterone system
RCT	Reversed cholesterol transport
Na ⁺	Sodium ion
S.E.	Standard error
O ₂ [•]	Superoxide radical
SOD	Superoxide dismutase
SNS	Sympathetic nervous system
TBARS	Thiobarbituric reactive substance
Trx	Thioredoxin
TCh	Total cholesterol

LIST OF ABBREVIATIONS

TG	Triglycerides
VLDL-Ch	Very low density lipoprotein-cholesterol
WBI	Whole body gamma irradiation
XO	Xanthine oxidase
XDH	Xanthine dehydrogenase
XOR	Xanthine oxidoreductase