Biological activity of some Egyptian Medicinal Plants

Thesis

Submitted for the Degree of PhD of Science
(Microbiology)

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Declaration

This dissertation has not previously been submitted for a degree at this or at any other university and is the original work of the writer.

Al-Shimaa, S. M. Abd-Elmegeed

Dedication

For my parents whom have been the wind beneath my wings until I completed this work

For my kids *Salma, Hanin, Anas & Karma*

I would like to express my sense of gratitude and thanks to my loving husband, *Ahmed,* for his continuous support and understanding. Without him, the finalization of this work would not have been done.

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List of Abbreviations

Abb.		Full Term
^{0}C	**:**	Degree Celsius.
4T1	**:**	breast cancer cells
A549 cell line	**:**	Human lung carcinoma cell line
AD	**:**	Anno Domini
AP	**:**	Animals bites and poisons
ATCC	**:**	American Type Culture Collection
B. subtilis	**:**	*Bacillus subtilis*
BCE	**:**	Before Common Era
BHA	**:**	Butylated hydroxyanisole.
BHT	**:**	Butylated hydroxytoluene.
CACO	**:**	Large intestinal carcinoma cell line
CAE	**:**	Crude acetone extract.
CAQE	**:**	Crude aqueous extract.
CE	**:**	Common Era
CEE	**:**	Crude ethanolic extract.
Cfu	**:**	Coliform units
DMSO	**:**	Dimethyl sulfoxide.
DPPH	**:**	Diphenyl picryl hydrazyl
DW	**:**	Disteled water
E. coli	**:**	*Escherichia coli*
E. faecalis	**:**	*Enterococcus faecalis*
ESβL, *E. coli*	**:**	Extended Spectrun β Lactamase producing *E. coli*
ESβL, *K. pneumoniae*	**:**	Extended Spectrun β Lactamase producing *K. pneumoniae*
EY	**:**	Eye diseases.
FBS	**:**	Fetal bovine serum.
gm DW	**:**	Gram dry weight
H. pylori	**:**	*Helicobacter pylori*
HL-60 cell line	**:**	Human promyelocytic leukemia cell line
HPLC	**:**	High performance liquid chromatography.
HS	**:**	Hemorrhoids and sexual diseases.
IC_{50}	**:**	The half maximal inhibitory concentration
ID	**:**	Internal diseases.
IH	**:**	Inflammations and heat.
K. pneumonia	**:**	*Klebsiella pneumonia*
LD_{50}	**:**	Median lethal dose
LIM1863 cell line	**:**	Human colorectal carcinoma cell line

MBC	**:**	Minimum Bactericidal Concentration.
MCF-7 cell line	**:**	Breast cancer cell line
MDR	**:**	Multi-drug resistant.
MDR, *S. pyogenes*	**:**	Multi-drug resistant *S. pyogenes*
M-H Broth	**:**	Muller-Hinton broth medium.
MIC	**:**	Minimum Inhibitory Concentration.
mM	**:**	Millimolar
MRSA	**:**	Methicillin-resistant *S. aureus.*
MβL, *P. aeruginosa*	**:**	Metallo-beta-lactamase producing *P. aeruginosa*
NCI	**:**	National Cancer Institute.
NCTC	**:**	National Collection of Type Cultures
P. aeruginosa	**:**	*Pseudomonas aeruginosa*
P. vulgaris	**:**	*Proteus vulgaris*
PA	**:**	Pains.
PBS	**:**	Phosphate buffered saline.
PE	**:**	Psychiatric and epilepsy.
QS	**:**	Quorum-sensing.
ROS	**:**	Reactive oxygen species.
RPMI 1640	**:**	Roswell Park Memorial Institute
Rt	**:**	Retention time.
S. aureus	**:**	*Staphylococcus aureus*
S. epidermis	**:**	*Staphylococcus epidermidis*
S. pyogenes	**:**	*Streptococcus pyogenes*
S. typhi	**:**	*Salmonella typhi*
S.F.	**:**	Survival fraction
SD	**:**	Skin diseases.
SI	**:**	Stomach and intestine.
SRB	**:**	Sulfo-Rhodamine B colorimetric assay.
TCM	**:**	Traditional Chinese medicine.
TE	**:**	Teeth.
TE buffer	**:**	Tris EDTA buffer
TSM	**:**	Traditional systems of medicine.
VWD detector	**:**	Variable Wavelength Detector
WB	**:**	Wounds and burns.
WHO	**:**	World Health Organization.
µM	**:**	Micromolar

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Abstract

Medicinal plants have been used as a source of therapies since ancient times in Egypt. The present study was designed to investigate the anti-bacterial, anti-oxidant and anti-tumor activities of aqueous and organic extracts from twenty selected medicinal plants, cultivated in Egypt then evaluate the anti-bacterial and anti-tumor activity of the most abundant identified phenolic compounds present in the best two plants using HPLC. The disk diffusion method and micro-broth dilution were used to determine MIC and MBC of the samples against 10 bacterial strains belonging to five species, *Pseudomonas aeruginosa, Klebsiella pneumonia, Escherichia coli, Staphylococcus aureus, Streptococcus pyogenes*. While phytochemical screening assay followed by 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay were used to assess the anti-oxidant of the extracts, the large intestinal carcinoma (CACO) cell line was used to evaluate the anti-tumor of these extracts by Sulfo-Rhodamine B colorimetric (SRB) assay. The results indicated that all studied crude extracts were able to inhibit the growth of at least three of the tested bacteria. All studied plants have, qualitatively, various bioactive components and were observed to be high to moderate antioxidant agents. Moreover, IC_{50} values below 20 µg/mL were recorded for the crude extract of *Origanum marjorana, Olea Europaea* and *Curcuma longa* in anti-tumor assay. Rutin, benzoic acid and salicylic acid were the most abundant phenolic compounds by HPLC in *Curcuma longa* and *Origanum marjorana*. Rutin and benzoic acid showed anti-bacterial activity against 100% and 80% of tested bacteria, respectively and expressed moderate cytotoxic activity with IC_{50} 22.7 and 47.8 µg/mL, respectively. Finally, the results of the present investigation provided supportive data for the possible use of the plant extracts investigated here in treatment of various diseases.

***Keywords*:** Anti-bacterial, Anti-oxidant, Anti-tumor, HPLC, Medicinal plants, Phytochemicals.