PHYTOCHEMICAL SCREENING OF SOME EGYPTIAN PLANTS FOR ANTIDIABETIC ACTIVITY

By

SHAIMAA SAYED TAHA SHOMAN

B.Sc. Agric. Sci. (Agric. Biochem.), Fac. Agric., Cairo Univ., 2010

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

In

Agricultural Sciences

(Agricultural Biochemistry)

Department of Agricultural Biochemistry
Faculty of Agriculture
Cairo University
EGYPT

2016

APPROVAL SHEET

PHYTOCHEMICAL SCREENING OF SOME EGYPTIAN PLANTS FOR ANTIDIABETIC ACTIVITY

Master Thesis
In
Agric. Sci. (Agricultural Biochemistry)

By

SHAIMAA SAYED TAHA SHOMAN

B.Sc. Agric. Sci. (Agric. Biochem.), Fac. Agric., Cairo Univ., 2010

APPROVAL COMMITTEE

Dr. HOSNY MOHAMED SHAFIK ABD EL SALAM .....
Professor of Biochemistry, Fac. Agric., Menia University

Dr. RADWAN SEDKY FARAG.....
Professor of Biochemistry, Fac. Agric., Cairo University

Dr. GHADA IBRAHIM MAHMOUD.....
Associate Professor of Biochemistry, Fac. Agric., Cairo University

Dr. MOHYE EL-DEIN ALI OSMAN .....
Professor of Biochemistry, Fac. Agric., Cairo University

Date: 1/6/2016

SUPERVISION SHEET

PHYTOCHEMICAL SCREENING OF SOME EGYPTIAN PLANTS FOR ANTIDIABETIC ACTIVITY

Master Thesis
In
Agric. Sci. (Agricultural Biochemistry)

By

SHAIMAA SAYED TAHA SHOMAN
B.Sc. Agric. Sci. (Agric. Biochem.), Fac. Agric., Cairo Univ., 2010

SUPERVISION COMMITTEE

Dr. MOHYE EL-DEIN ALI OSMAN
Professor of Biochemistry, Fac. Agric., Cairo University

Dr. GHADA IBRAHIM MAHMOUD
Associate Professor of Biochemistry, Fac. Agric., Cairo University

Name of candidate: Shaimaa Sayed Taha Shoman **Degree:** M.Sc.
Title of Thesis: Phytochemical Screening of Some Egyption Plants for Antidiabetic Activity.
Supervisors: Dr. Mohye El-Dein Ali Osman
Dr. Ghada Ibrahim Mahmoud
Department: Agricultural Biochemistry **Branch:** Biochemistry
Approval: 1/ 6/2016

Abstract

Diabetes mellitus is one of the most common rapidly increasing endocrine disorders all over the world. Some bioactive compounds from plants may work as hypoglycemic agents. The objective of this study is to assess the antidiabetic activity of 11 Egyptian plant samples. This study also aimed to study the toxicity of the most promising plant extracts. Phytochemical screening of 70 % ethanolic extract (EE) has shown to be rich in steroids, terpenoids, flavonoids, tannins and phenols in 11 plant samples. The antioxidant activity using DPPH gave IC_{50} ranged between 437.83 µg/ml (*Vitis vinifera* leaves) and 1106.19 µg/ml (*Ficus sycomorus* leaves). The total phenolic content of EEs was ranged between 13.05±0.99 ppm (*Brassica oleracea* leaves) and 119.28±4.28 ppm (*Ipomoea batatas* leaves). The anti-diabetic activity of EE at 500 mg/Kg b. w. administrated orally to streptozotocin-induced diabetic rats showed significant reduction in mean blood glucose levels (233.4±34.65 mg/dl) of *Ficus carica* L. followed by (263±28.51 mg/dl) of *Vitis vinifera* compared to diabetic control group (293.60 mg/dl) during 24 h. The EE of *Ficus carica* L. dry leaves (21.50 %) was further successively fractionated by solvents extraction, hexane fraction, diethyl ether fraction, ethyl acetate fraction, and residue fraction. The anti-diabetic activities of each fraction were determined where the higher reduction in blood glucose level (BGL) was found in diethyl ether fraction (DEEF). Twenty eight day experiments were carried out to determine the effect of *Ficus carica* L. leaves EE and DEEF and to determine the toxicity of these fractions included histopathological studies. The results showed a significant reduction in BGL of EE and DEEF (183.52±14.82 and 195.07±12.45 mg/dl, respectively) with marked improvement in histopathological structure of liver and pancreas in addition to non toxic effect in normal rats. GC/MS/MS analysis for DEEF indicated the presence of six antidiabetic compounds.

Key words: Antidiabetic, *Ficus carica* L., *Vitis vinifera*, Antioxidant, Phenolic compounds, GC/MS/MS, Histopathological studies.

DEDICATION

I dedicate this work to my parents, my brothers, my sister, my son and my husband for all the support they lovely offered during my post-graduate studies.

ACKNOWLEDGEMENT

It is my pleasure to record my deepest thanks to my Allah.

I am greatly indebted to ***Dr. Mohey El-Dein Ali Osman*** *Prof. of Biochemistry, Faculty of Agriculture, Cairo University for his supervision, great help, faithful guidance and continuous encouragement through this work.*

My appreciation and great thanks are extended to ***Dr. Ghada Ibrahim Mahmoud*** *assistant Prof. of Biochemistry, Faculty of Agriculture, Cairo University and* ***Dr. Ramy Mohamed Romeilah*** *Prof. of Biochemistry, Faculty of Agriculture, Cairo University for her/his supervision, guidance and help through this work.*

Grateful appreciation is also extended to all staff members of the Biochemistry Department, Faculty of Agriculture, Cairo University.

Special deep appreciation is given to my parents, my brothers, my sister, my son and my husband.

LIST OF ABBREVIATION

No.	Abbreviation	
1	AC	Ash contet
2	CE-DAD	Capillary electrophoresis equipped with a diode-array detector
3	DW	Dry weight
4	DEEF	Diethyl ether fraction
5	DNJ	Deoxynojirimycin
6	DPPH	1,1 Diphenyl,2-picryl hydrazyl radical
7	EAF	Ethyl acetate fraction
8	EC50	Half maximal effective concentration
9	EE	ethanolic extract
10	FRAP	Ferric reducing antioxidant power
11	GAE	Gallic acid equivalent
12	GLUT4	Glucose receptor 4
13	HbA1C	Glycated hemoglobin
14	HF	Hexane fraction
15	IC_{50}	50 % inhibition concentration
16	LPO	Lipid peroxidation
17	IGT	Impaired glucose tolerance
18	MC	Moisture content
19	MDA	Malondialdehyde
20	mM TE	mM trolox equivalent
21	OGTT	Oral glucose tolerance test
22	PPAR-γ	Peroxisome proliferation -activated Receptor-gamma
23	QE	Quercetin equivalent
24	RC_{50}	50 % reduction concentration
25	RC	Red cabbage
26	RF	Rest of fractions
27	STZ	Streptozotocin
28	T2DM	Diabetes mellitus type 2
29	TAE	Tannic acid equivalent
30	TL	Total lipids
31	TP	Total proteins

CONTENTS