MEDICINAL HERBS AS A SOURCE OF ANTIMICROBIAL SUBSTANCES

By

MOHAMED AHMED EID ALWAKEEL

B.Sc. Agric. Sci. (Agricultural Production), Fac. Agric., Alexandria Univ., 2000

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APPROVAL SHEET

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ABSTRACT

This study aimed to test a variety of naturally occurring some medicinal herbs and their extracts for their antimicrobial potential against a group of some bacterial and fungal pathogens. A total of 6 herbs (*Thymus vulgaris, Foeniculum vulgare, Datura stramonium, Matricaria chamomilla, Ammi visnaga* and *Cassia angustifolia*). The antimicrobial activity of aqueous, methanol and petroleum ether extracts were evaluated by measuring the inhibition zone by agar well diffusion method and minimum inhibitory concentration (MIC) in order to increase the reliability and precision of the study. A number of 5 bacterial, 3 fungal and 1yeast species were chosen: G+ Bacteria: *Staphylococcus aureus, Bacillis subtilis.*G- Bacteria: *Pseudomonas aeruginosa*, *Escherichia coli, Klebsiella pneumonia.* Fungi (molds): *Aspergillus fumigatus, Penicillium italicum, Syncephalastrum racemosum,* and (yeast): *Candida albicans*. The three different solvents gave markedly varied abilities to extract the antimicrobial compounds active against versatile groups including G+, G- bacteria and fungi. The active antagonism of crude methanolic extract can be descendingly arranged as Thyme> Senna> Fennel>Datura>Chamomile while the extract from *Ammi vesnaga* gave negative results. Methanolic extracts gave in MICs of 0.015-7.81 µg/ml (Thyme), 0.49 – 125µg/ml (Senna) and 31.25 – 500 µg/ml (Fennel) compared to MICs of 3.9 – 500 µg/ml, 31.25 – 500 and 15.63 – 500 µg/ml for those of ether extracts respectively in the same order of herbs. Essential oil and extracts of two herbs (*Thymus vulgaris*, *Foeniculum vulgare*), were analyzed by Gas Chromatography/Mass Spectrometry analysis which revealed the presence of 12 peaks in fennel essential oil indicating the presence of 12 phytochemical constituents representing 100% of the oil, while GC-MS analysis revealed the presence of 14 peaks in thyme essential oil which indicating the presence of 14 phytochemical constituents representing 99.98% of the oil.

Key words: Medicinal herbs, Antimicrobial activity, *Thymus vulgaris*, *Foeniculum vulgare, Datura stramonium, Matricaria chamomilla, Ammi visnaga, Cassia angustifolia*, MIC, Gas chromatography/mass, Essential oil.

DEDICATION

I dedicate this work to whom my heartfelt thanks; to my parents, my brothers for their patience help and for all the support they lovely offered along the period of my post graduate studies.

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CONTENTS

INTRODUCTION

The use of plants and their products has a long history that began with folk medicine and through the years has been incorporated into traditional and allopathic medicine (Dubey *et al*., 2011). Since antiquity, many plants species reported to have pharmacological properties as they are known to posses various secondary metabolites like glycosides, saponins, flavonoids, steroids, tannins, alkaloids, tirpenes which is therefore, should be utilized to combat the disease causing pathogens (Kamali and Elamir, 2010).

The use of medicinal plants as a source for relief from illness can be traced back over five millennia to written documents of the early civilization in China, India and the Near east, but it is doubtless an art as old as mankind. The potential of higher plants as source for new drugs is still largely unexplored. Among the estimated 250,000-500,000 plant species, only a small percentage has been investigated phytochemically and the fraction submitted to biological or pharmacological screening is even smaller (Gerhartz *et al*., 1985).

Historically pharmacological screening of compounds of natural or synthetic origin has been the source of innumerable therapeutic agents (Kroschwitz and Howe-Grant, 1992). Antibiotics are undeniably one of the most important therapeutic discoveries of the 20th Century that had effectiveness against serious microbial infections. A wide range of medicinal plant parts is used for extracting raw drugs as they possess varied medicinal properties. The different parts used include root, stem, flower, fruit, twigs exudates and modified plant organs.